Environmental Assessment

Reducing Waterfowl Damage by Incorporating an Integrated Waterfowl Damage Management Plan throughout the State of Georgia

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AAWV	American Association of Wildlife Veterinarians
AC	Alpha Chloralose
AF	Atlantic Flyway
AFC	Atlantic Flyway Council
AP	Atlantic Population
APHIS	Animal Plant Health Inspection Service
BCC	Biological Carrying Capacity
BPI	Breeding Plot Index
CDCP	Centers for Disease Control and Prevention
CEQ	Council of Environmental Quality
CFR	Codes of Federal Regulation
EA	Environmental Assessment
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FDA	U.S. Food and Drug Association
FEIS	Final Environmental Impact Statement
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
GADNR	Georgia Department of Natural Resources
INAD	Investigational New Animal Drug
IPM	Integrated Pest Management
IWDM	Integrated Wildlife Damage Management
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
MBTA	Migratory Bird Treaty Act
MIS	Management Information System
MWS	Mid-winter Waterfowl Survey
NOA	Notice of Availability
SCWDS	Southeastern Cooperative Wildlife Disease Study
T&E	Threatened and Endangered Species
UGA	University of Georgia
USFWS	U.S. Department of Interior, Fish and Wildlife Service
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
WAC	Wildlife Acceptance Capacity
WEMP	Waterfowl Ecology and Management Program
WS	Wildlife Services

1.0 CHAPTER 1: PURPOSE AND NEED FOR ACTION

1.1 INTRODUCTION

Since the first settlers set foot on American soil, humans have struggled to maintain a coexistence with local wildlife. Through human expansion and land use, wildlife habitat has diminished throughout the years. These human uses and needs often compete with wildlife which, in turn, increases the potential for human/wildlife interactions. Some portray wildlife encounters as a majestic intervention which gives a sense of beauty and a sustainable coexistence. Others view wildlife as mere pest who deliberately cause conflicting interactions with humans uses and needs. To be able to distinguish and maintain a medium between different wildlife views, a Waterfowl Management Plan must be implemented. The *Animal Damage Control Programmatic Final Environmental Impact Statement* (EIS) summarizes the relationship in American culture of wildlife values and wildlife damage in this way {United States Department of Agriculture (USDA) 1997}:

> "*Wildlife has either positive or negative values, depending on varying human perspectives and circumstances . . . Wildlife is generally regarded as providing economic, recreational and aesthetic benefits . . . and the mere knowledge that wildlife exists is a positive benefit to many people. However . . . the activities of some wildlife may result in economic losses to agriculture and damage to property . . . Sensitivity to varying perspectives and value is required to manage the balance between human and wildlife needs. In addressing conflicts, wildlife managers must consider not only the needs of those directly affected by wildlife damage but a range of environmental, sociocultural and economic considerations as well.*"

The USDA is authorized to protect American agriculture and other resources from wildlife damage and provide a safeguard on health related risk associated with wildlife. The primary statutory authority for the Wildlife Service (WS) program is the Act of March 2, 1931, as amended (7 U.S. C. 426426c; 46 Stat. 1468) and the Rural Development, Agriculture, and Related Agencies Appropriations Act of 1988, Public Law 100-102, Dec. 27, 1987. Stat. 1329-1331 (7 U.S.C. 426c), and the Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act of 2001, Public Law 106-387, October 28, 2000. Stat. 1549 (Sec 767). WS activities are conducted in cooperation with other federal, state and local agencies, and private organizations and individuals. Federal agencies, including the United States Department of Interior, United States Fish and Wildlife Service (USFWS), recognize the expertise of WS to address wildlife damage issues related to migratory birds and other wildlife associated with health risk and agriculture/resource damage.

Wildlife damage management is the science of reducing damage or other problems caused by wildlife and is recognized as an integral part of wildlife management (The Wildlife Society 1990). The USDA, Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) program (formerly known as Animal Damage Control) uses an Integrated Wildlife Damage Management (IWDM) approach, known as Integrated Pest Management (WS Directive 2.105[1]), in which a combination of methods may be used or recommended to reduce wildlife damage. IWDM is described in Chapter 1, 1-7 of the Animal Damage Control Program Final Environmental Impact Statement (USDA 1997). These methods include the alteration of cultural practices as well as habitat and behavioral modification to prevent damage. The reduction of wildlife damage may also require that the offending animal(s) be removed or that populations of the offending species be reduced through lethal and non-lethal methods.

WS's mission is to "provide federal leadership in wildlife damage management in the protection of America's agricultural, industrial and natural resources, and to safeguard public health and safety." This is accomplished through:

A) training of wildlife damage management professionals;

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[1] WS Policy Manual - Provides guidance for WS personnel to conduct wildlife damage management activities through Program Directives. WS Directives referenced in this EA can be found in the manual but will not be referenced in the Literature Cited Appendix.

B) development and improvement of strategies to reduce economic losses and threats to humans from wildlife;
C) collection, evaluation, and dissemination of management information;
D) cooperative wildlife damage management programs;
E) informing and educating the public on how to reduce wildlife damage and;
F) providing data and a source for limited use management materials and equipment, including pesticides (USDA 1989).
G) providing wildlife data through extensive evaluation of the targeted wildlife associated with damage (age, sex, etc.)

This environmental assessment (EA) evaluates ways by which this responsibility can be conducted to resolve damage, health risk, and conflicts associated with Canada geese (*Branta canadensis*), lesser snow geese (*Anser caerulescens caerulescens*), mallard ducks (*Anas platyrhynchos*), mute swans (*Cygnus olor*) and domestic or feral waterfowl in Georgia. WS strives to reach and maintain a balance between both wildlife and human needs and welfare. Humans and waterfowl are both essential elements in today's evolving environment. Through human expansion and environmental degradation, waterfowl and human intervention is steadily rising each year. WS realizes that both have sets of needs and welfare that must be considered when selecting proper methods and approaches for a waterfowl damage management program. WS conducts wildlife damage management as a means of reducing damage by translocation, deterrence, exclusions, and removal.

WS is a cooperatively funded and service oriented program. Before any operational wildlife damage management is conducted, *Agreements for Control* or *WS Work Plans* are completed by WS and the land owner/administrator. WS cooperates with private property owners and managers and with agencies, as requested and appropriate, with the goal of effectively and efficiently resolving wildlife damage problems in compliance with federal, state, and local laws, regulations, policies, orders, and procedures including the Endangered Species Act (ESA) and Migratory Bird Treaty Act (MBTA).

Most individual actions of the types encompassed by this analysis could be categorically excluded under the APHIS Implementing Regulations for compliance with the National Environmental Policy Act (NEPA) (7 CFR§372.5(c)). APHIS Implementing Regulations also provide that all technical assistance furnished by WS is categorically excluded (7 CFR§372.5(c)) (60 Federal Register 6,000, 6,003 (1995)). However, WS is preparing this EA to assist in planning waterfowl damage management activities and to clearly communicate with the public the analysis of cumulative impacts and issues of concern in relation to alternative means of for such management requirements in Georgia. This analysis covers current and future waterfowl damage management activities by WS encompassing 37,068,000 acres (159 counties) of Georgia.

This EA documents the analysis of the potential environmental effects of the proposed program. This analysis relies mainly on existing data contained in published documents (Appendix A), including the Animal Damage Control Final Environmental Impact Statement (USDA 1997).

1.2 PURPOSE

The purpose of this EA is to analyze the effects of WS activities in Georgia to reduce damage associated with Canada geese, lesser snow geese, mallard ducks, mute swans, and domestic or feral waterfowl. Resources potentially protected by such activities include property, agriculture, natural resources, and human health/safety.

1.2.1 Summary of Proposed Action

The proposed action is for WS to continue to implement an Integrated Waterfowl Damage Management Program that responds to requests for waterfowl damage management to protect property, agricultural resources, natural resources, human health and human safety in Georgia. Requests for assistance may occur anywhere and anytime within the state. An IWDM approach would be implemented which would allow the use of legal techniques and

methods, used singly or in combination, to meet requester needs for reducing conflicts with waterfowl (Appendix B). Cooperators requesting assistance would be provided with information regarding the use of effective non-lethal and lethal techniques. Non-lethal methods recommended and used by WS may include resource management, physical exclusion, relocation, and deterrents (Appendix B). Lethal methods recommended and used by WS may include nest/egg treatment/destruction, live capture and euthanasia, and/or shooting (Appendix B). In many situations, the implementation of non-lethal methods such as manipulation of habitat, application of repellents, and installation of fencing, flagging, and exclusion devices would be conducted by the requestor. Waterfowl damage management assistance would be conducted by WS in Georgia, when requested, on private and public property, facilities, and housings where a need exists and pursuant to an *Agreement for Control.*

The proposed program conducted by WS in GA would continue to be conducted pursuant to applicable laws and regulations authorizing take of waterfowl and their nest and eggs, developed through partnerships among WS, the USFWS, and the Georgia Department of Natural Resources (GADNR), and as requested by and through coordination with requesters of assistance. All management actions would comply with appropriate federal, state, and local laws.

1.3 NEED FOR ACTION

Wildlife management is often perceived as the struggle to preserve threatened and endangered (T & E) species, regulate species exploited by humans and the humans who exploit them, and conserve the environment that provides habitat for wildlife resources. Increasingly, however, cities, towns, parks, airports, and private properties have become sites of some of the greatest challenges for wildlife management. When the presence of prolific adaptable species such as Canada geese, lesser snow geese, mallard ducks, mute swans, and domestic or feral waterfowl is combined with human expansion and interest in being close proximity to wildlife, conflicts often develop. Long thought of as a spectacular sight during the spring and fall migration, waterfowl are now frequently and abundantly present in cities and towns throughout Georgia and across the United States. They are generally regarded as providing ecological, educational, economic, recreational, and aesthetic benefits (Decker and Goff 1987), and there is enjoyment in knowing wildlife exists and contributes to natural ecosystems (Bishop 1987). The native waterfowl species adds an aesthetic component to wetlands and sometimes provides opportunities for recreational hunting. Waterfowl, like all wildlife, provide people with valued close contact with nature. Many people, even those experiencing damage, consider waterfowl to be a charismatic and valuable component of their environment. However, tolerance of waterfowl behavior differs among people (Smith et al. 1999). Because of their prolific nature, site tenacity, longevity, size, and tolerance of human activity, waterfowl are often associated with problem situations. Waterfowl, such as Canada geese, are extremely adaptable and may use the food and protection provided by humans in urban landscapes for nesting, raising young, molting feeding, and nesting. Increasing populations of resident waterfowl are resulting in increasing numbers of conflicts with human activities (Conover and Chasko 1985), and increasing concerns related to human health and safety (Ankney 1996). Because they can fly, waterfowl are mobile, they exploit a variety of habitats and sites within a given area, and they cannot be permanently excluded from large areas. It is rarely desirable or possible to eliminate all nuisance waterfowl from an area, but with a proper management scheme, nuisance waterfowl numbers and related problems may be reduced to a level that a community can tolerate. Additionally, management of waterfowl-related problems often exceeds the capabilities of single landowners to reduce damage to tolerable levels. In Georgia, problem situations associated with waterfowl typically involve, but are not limited to, unacceptable and potentially dangerous accumulations of feces, waterfowl aggression during the nesting season, grazing of landscaped vegetation, damage to agricultural and natural resources, and unacceptable safety hazards for vehicles (automobiles, boats, airplanes). These problems frequently occur on private home properties, apartment/condominium complexes, municipal parks, schools, hospitals, natural/habitat restoration sites, corporate and industrial sites, office complexes, roadways, airports, and other areas.

1.3.1 Wildlife Acceptance Capacity (WAC) and Biological Carrying Capacity (BCC)

Human dimensions of wildlife management include identifying how people are affected by problems or conflicts with wildlife, attempting to understand people's reactions, and incorporating this information into policy and management decision making processes and programs (Decker and Chase 1997).

Wildlife Acceptance Capacity (WAC), sometimes known as cultural carrying capacity, is the maximum wildlife population level in an area that is acceptable to people (Decker and Purdy 1988). This phrase is important because it defines the sensitivities of the local community to a specific wildlife species or problem. For wildlife damage situations, there will be varying thresholds for those people directly and indirectly affected by the damage. This threshold of damage is a primary limiting factor in determining the WAC. Once this WAC is met or exceeded, people seek to implement waterfowl population reduction methods to alleviate property damage and threats to human health or safety.

Biological Carrying Capacity (BCC) is the wildlife population level that the land or habitat can support without degradation to the populations health, animals' health or the environment over an extended period of time (Decker and Purdy 1988). While the biological carrying capacity for waterfowl in Georgia may be greater than the statewide population, the WAC is probably lower. This factor may be augmented through human intervention. Human intervention such as supplemental feeding and construction of artificial nesting sites and homes may cause the BCC to be higher than the surrounding environment could actually support. In such instances the WAC will affect the BCC.

1.3.2 Waterfowl in Georgia

The WS program is concerned with the management of nuisance and damaging waterfowl throughout the state of Georgia. These species of waterfowl include Canada geese, lesser snow geese, mute swans, mallards, and domestic or feral waterfowl (ducks, geese, and swans). Flyway Councils, which are comprised of representatives from member States and Provinces, make recommendations to the USFWS on matters regarding migratory game birds, including migratory waterfowl. The flyway system is divided into four administrative units; the Atlantic, Mississippi, Central, and Pacific Flyway Councils. Georgia is considered part of the Atlantic Flyway Council for the management of migratory birds.

Migrant and Resident Canada Geese: There are two behaviorally distinct types of Canada goose populations: Resident and Migratory. The majority of Canada geese present in Georgia are resident, not migratory. These birds reside in Georgia year around, and fly short distances between their summering and wintering grounds. The population estimate for resident Canada geese in Georgia for the fiscal year of 2003 was approximately 134,528 (G. Balkcom, GADNR 2004). The GADNR population management goal for resident Canada geese in Georgia is 30,000 geese, or about one bird per 1.9 square miles (G. Balkcom, GADNR 2004). Historically, migratory Canada geese passed through Georgia on their way to St. Marks National Wildlife Refuge. This refuge served as an important wintering ground for several species of migratory waterfowl. Today virtually no migratory Canada geese reside in Georgia during the winter migration (G. Balkcom, GADNR 2004). No population estimates were available for migratory Canada geese in Georgia.

Migrant Lesser Snow Geese: Snow geese are beginning to proliferate in Georgia during their winter migration. There are two species of snow geese, the lesser snow goose and the greater snow goose. The lesser snow goose is the species that sometimes over winter in Georgia. Snow geese generally winter in agricultural areas of Arkansas, Louisiana, and Texas. Breeding areas are located in Hudson Bay Canada and include grassy tundra areas located near large bodies of water. Currently there are no population estimates for migrant lesser snow geese in Georgia.

Migrant and Resident Mallards: There are two behaviorally distinct types of mallard populations: Resident and Migratory. Migratory mallards pass through Georgia on their Atlantic flyway route to their wintering grounds.

Resident mallards reside in Georgia year around, and fly short distances between their summering and wintering grounds. Breeding mallards seen in Georgia are often times feral domestic stock. Often these feral birds are pets and reside at the same location upon which they were born. Currently these are no population goals or estimates for resident or migratory populations of mallards in Georgia.

Domestic and Feral Waterfowl: Domestic waterfowl refers to captive-reared, domestic, of some domestic genetic stock, or domesticated breeds of ducks, geese and swans. Examples of domestic waterfowl include, but are not limited to, Muscovy ducks, Pekin ducks, Rouen ducks, Cayuga ducks, Swedish ducks, Chinese geese, Toulouse geese, Khaki Campbell ducks, Embden geese, and pilgrim geese. Feral ducks may include a combination of mallards, muscovies, and mallard/muscovy hybrids. Muscovy ducks are the only domestic ducks that are not derived from the mallard stock. This particular species is indigenous to South America. Domestic and feral waterfowl generally reside in areas, such as lakes and ponds, year around. These domestic birds are also often found in areas were resident Canada geese inhabit. Currently there is no population estimates for domestic and feral waterfowl in Georgia. Domestic and feral waterfowl are not protected by federal and state laws and are not considered for population goal requirements.

Mute Swans: Since 1986, the Atlantic Flyway population of mute swans has grown 118%, from 5,800 birds to over 12,600 swans. This growth is seen throughout the Flyway, especially in the Chesapeake Bay region (Maryland and Virginia) which has increased 1271.3% (Atlantic Flyway Council 2000). This rapid growth rate in the Chesapeake Bay shows the potential growth rate that this invasive species could have throughout the Flyway. Mute swans are nonindigenous to Georgia. Biologically, the optimum mute swan population size for Georgia is zero. Therefore, on state, federal, and other public lands the goal is zero mute swans (Atlantic Flyway Council 2003). In 1989, 26 mute swans were sighted in Georgia. At that time the majority of these birds occurred on privately owned ponds and lakes. At present, there are approximately 250 mute swans in Georgia and all are believed to reside on private lands (Atlantic Flyway Council 2003). These swans are a potential nucleus for a future feral population (Atlantic Flyway Council 2000). The only management strategy currently identified in Georgia is to limit mute swans to private ponds only, and prevent their establishment on public waters (Atlantic Flyway Council 2003),

1.3.2.1 Ecology, Behavior and Population Status

1.3.2.1.1 Resident Canada Geese

A resident Canada goose is one that nests and/or resides on a year round basis within the contiguous United States (Rusch et al. 1995, Ankney 1996). The USFWS and the States estimate current resident Canada goose population at 3.2 million in the United States; about 30% to 35% above the number States believe to be acceptable based on their needs to mange conflicts and problems caused by excessive numbers of resident Canada geese (USFWS 2003). More specifically, the Atlantic Flyway Council defines a "resident" Canada goose in the Atlantic Flyway as geese that are hatched or nest in any Atlantic Flyway state, or in Canada at or below 48^0 N latitude and east of 80^0 W longitude, excluding Newfoundland. This population inhabits the states along the U.S. Atlantic Coast, southern Quebec, and the southern Maritime Provinces of Canada (U.S. Fish and Wildlife Service 2001). As their name implies, resident Canada geese spend most of the year near their breeding areas, although many in northern latitudes do make seasonal movements (Atlantic Flyway Council 1999). Resident Canada geese were introduced into the Atlantic Flyway during the early 1900's and now comprise the largest population of geese in the Flyway (Atlantic Flyway Council 1999). Spring surveys in 2004 indicated there were 980,400 resident Canada gees in the Atlantic Flyway, about 10% fewer than in 2003 (USFWS 2004). These estimates have increased an average of 2% per year since 1994. As reported by the North American Breeding Bird Survey, resident breeding populations of Canada geese in the Eastern Breeding Bird Survey Region and Georgia have increased annually at rates of 19.4% and 29.8%, respectively, from 1966-2003 (Sauer et al. 2004).

Resident Canada geese become sexually mature and breed at two or three years of age and have a relatively high nesting success compared to migrant Canada geese (U.S. Fish and Wildlife Service 2001). Breeding resident Canada geese occur in every county of Georgia, and nest primarily during March-May each year. The breeding

population is monitored annually through the Breeding Waterfowl Survey. In Georgia, resident Canada geese nest in traditional sites (along shorelines, on islands and peninsulas, small ponds, lakes, reservoirs, etc.), as well as on rooftops, adjacent to roadways, swimming pools, and in parking lots, playgrounds, planters, and abandoned property (tires, automobiles, etc.).

Molting is the process whereby geese annually replace their primary and secondary flight (wing) feathers (Welty 1982). In Georgia, resident Canada geese molt, and are flightless, from mid-June through mid-July each year. Portions of a flock of geese can be flightless from about one week before and two weeks after the primary molt period due to the asynchronous molting by individual birds. Nonbreeding resident Canada geese which have failed nesting attempts sometimes move to other areas in late spring prior to molting (Zicus 1981, Nelson and Oetting 1991, Abraham et al. 1999).

The first management plans for resident Canada geese were developed in 1999, when it became apparent that they were contributing significantly to sport harvests and human/goose conflicts. Resident geese are now the most numerous goose population in the flyway, and in 1999 the Atlantic Flyway Council approved a management plan to guide their management (Atlantic Flyway Council 1999). Five Management Objectives are identified in the Atlantic Flyway Resident Canada Goose Management Plan (Atlantic Flyway Council 1999):

A) Reduce resident Canada goose populations in the Atlantic Flyway (AF) to 650,000 birds (spring estimate) by 2005, distributed in accordance with levels prescribed by individual states and provinces.
B) Permit a wide variety of effective and efficient options for relief of damage and conflicts associated with resident Canada geese.
C) Provide maximum opportunities for use and appreciation of resident Canada geese, consistent with population goals.
D) Ensure compatibility of resident goose management with management of migrant goose populations in the AF, and vice versa.
E) Annually monitor populations, harvest, and damage/conflict levels to evaluate effectiveness of management options.

In Georgia, GADNR began a program in 1975 to re-establish Canada geese. During the late 1970's and early 1980's thousands of Canada geese were restocked on reservoirs and farm ponds across the state. These Canada geese quickly adapted to Georgia habitats and the resident goose population grew and expanded across the state. Canada geese have adapted so well in some urban and suburban areas that they have become problematic and in some situations have become a health and safety risk. The Georgia statewide resident Canada goose population for 2003 was estimated at 134,528 birds. The type of waterfowl population objective, which applies to resident Canada geese, is "optimum". This means that waterfowl biologists do not want to population size to fall too far below or go too far above the population objective. The population management goal for resident Canada geese in Georgia is 30,000 geese, or about one bird per 1.9 square miles (G. Balkcom, GADNR 2004). This population goal is thought to provide optimal recreational opportunities while reducing nuisance and damage complaints. Maintenance of the population is established by hunting laws/seasons and nuisance waterfowl removal from specified areas. Table 1 provides resident Canada goose population trends in Georgia from 1998 to 2003.

Table 1 - Resident Canada goose population trends in Georgia (G. Balkcom, GADNR 2004)

Year	Number of Resident Canada Geese
1998	44,374
1999	86,475
2000	42,580
2001	140,160
2002	173,378
2003	134,528

1.3.2.1.2 Migratory Canada Geese

Migratory Canada geese are those which nest and raise their young in the arctic and sub-arctic regions of Canada. Migrant geese begin moving north in time to arrive on their breeding grounds concurrent with the disappearance of ice cover and the availability of nest sites. Most subspecies of migratory geese do not nest until the ages of 3-5 years (Hardy and Tacha 1989, Moser and Rusch 1989, Rusch et al.1996). Migrating Canada geese move northward fairly gradually following the retreating snow cover (Bellrose 1980). For the last portion of migration, northern-nesting geese often over fly areas of snow in boreal forests to arrive on Arctic and Subarctic nesting areas just as spring breaks. The most southerly wintering geese leave their wintering areas in January and geese wintering at middle-latitudes move northward in March or April (Bellrose 1980). Georgia has relatively no migrant Canada geese that rest or bay in route to their wintering grounds (GADNR 2004). Georgia Christmas Bird Count data from 1966-2003 shows an increasing trend for wintering populations of Canada geese throughout the state (National Audubon Society 2003).

In the Atlantic flyway, migratory Canada geese consist primarily of the Atlantic Population (AP), North Atlantic Population (NAP), and the Southern James Bay Population (SJBP) (USFWS 2004). The wintering migratory population in Georgia is mostly comprised of the AP and SJBP. The USFWS provides the following status report for the three migratory populations of Canada geese in the Atlantic flyway for 2004 (USFWS 2004):

Atlantic Population

This population of migratory Canada geese nest throughout Quebec, especially along the Ungava Bay, the eastern shore of Hudson Bay, and the Ungava Peninsula and winters from New England to South Carolina. In 2004, the number of breeding pairs for the Atlantic Population was estimated to be 174,800, 11% more than the 2003 estimate. This population has increased from a low of 29,000 breeding pairs in 1995. The breeding pair estimates have increased 20% per year since 1995. The estimated total 2004 spring population of Atlantic Population geese was 1,014,600 birds. This was 33% higher than the 2003 estimate, but likely was inflated by the presence of many molt migrants.

North Atlantic Population

This population of migratory Canada geese nests in Newfoundland and Labrador, and although they do mix with AP and Resident geese during the winter, they maintain more coastal distributions. In 2004, there were an estimated 67,800 pairs of geese in the NAP, 12% higher than in 2003. Indicated pair estimates have declined an average of 3% per year since 1996. There are an estimated 197,200 NAP geese in the

Atlantic Flyway in 2004, 48% higher than 2003 estimates. Total goose estimates have declined an average of 2% per year since 1996.

Southern James Bay Population
This population nests on Akimiski Island in James Bay and in the adjacent Hudson Bay lowlands to the south and west. The Southern James Bay Population winters from southern Ontario and Michigan to Mississippi, Alabama, Georgia, and South Carolina. In 2004, breeding ground surveys indicated a spring population of 101,000 geese, 5% lower than 2003 estimates. These estimates have decreased an average of 1% per year since 1995.

1.3.2.1.3 Migratory Lesser Snow Geese

The mid-continent light goose population (MCP), which includes lesser snow geese and an increasing number of Ross's geese, nest along the west coast of Hudson Bay and on Southampton and Baffin Islands. These geese primarily winter in eastern Texas, Louisiana, and Arkansas, but also can be found wintering in Georgia (USFWS 2004). During the 2004 mid-winter survey, an estimated 2.15 million light geese were counted in the MCP, 12% fewer than 2003 estimates (USFWS 2004). These estimates have declined an average of 2% per year since 1995, but show an overall increasing trend from an estimated population of 1.3 million geese in 1980 (USFWS 2004).

1.3.2.1.4 Mallard Ducks

The mallard is Georgia's most abundant and widespread breeding species of duck. These dabbling ducks occur across the continent in every U.S. state and Canadian province (Bellrose 1976). Mallards are most common in farmlands with numerous ponds, lakes, reservoirs, and slowly flowing streams; in areas with extensive or numerous marshes near grasslands; and in idle and brushy areas dotted with ponds and laced with meandering streams (Hartman 1992). They make up approximately 13% of Georgia's duck harvest annually. Like geese, mallards are also found in urban and suburban areas such as parks, golf courses, natural wetlands, retention ponds and lakes, housing complexes, and industrial parks. Mallards breed in all 159 counties in Georgia and begin their breeding season in late March and early April; with most nesting occurring from mid-April through mid to late May. Re-nesting occurs into early July (Hartman 1992). Mallards breed readily with American black ducks and domestic ducks. The offspring of the cross with domestics may resemble the mallard, but their markings and coloration are noticeably different. Mallard-black duck hybrids are considered to be wild ducks; evidence suggests that the two are closely related (Hartman 1992).

For population trends, migratory waterfowl are surveyed in two distinct areas: Traditional and Eastern survey areas. Traditional survey areas included representative waterfowl populations in all four flyways (Atlantic, Mississippi, Central, and Pacific). Eastern survey areas encompass areas on the eastern seaboard (Atlantic Flyway). Table 2 provides population estimates for breeding mallards based upon these two surveys from 1998 through 2003.

Table 2-Breeding populations of mallards in the eastern and traditional survey areas (USFWS 2004)

Year	Eastern Survey Area	Traditional Survey Area
1998	363,200	9,640,400
1999	280,800	10,805,700
2000	212,300	9,470,200
2001	285,700	7,904,000
2002	295,100	7,503,700
2003	383,100	7,949,700

Breeding Bird Survey trend data from 1966-2003 indicate that mallard duck populations have increased at an annual rate of 16.9%, 3.3%, and 3.2% throughout Georgia, the United States, and the eastern region, respectively (Sauer et al. 2004). Georgia Christmas Bird Count data from 1966-2003 shows a stable population trend for wintering populations of mallard ducks throughout the state (National Audubon Society 2003).

1.3.2.1.5 Mute Swans

Mute swans are not native to North America, having been introduced from Europe in the 1800's. Feral populations became established over time as swans that had escaped or been intentionally released from captivity survived and reproduced in the wild. Mute swans prefer freshwater ponds and streams of 10 acres or less and coastal bays and salt marshes. Eastern birds migrate short distances to coastal bays for the winter. The swan's diet consists mostly of rooted aquatic vegetation. Small islands, narrow peninsulas, and clumps of aquatic vegetation are preferred nesting sites. Nesting territories vary in size from 4 to 10 acres and are used year-around or reoccupied each year. The mute swan lays the largest of all swan eggs, and a typical clutch of four to eight eggs takes 35 to 38 days to hatch. Mute swans are capable of breeding by their third spring and will continue throughout their life. Approximately 59.7% of mute swan broods survive during the first year of life (Allin et al 1987). Survival of mute swans may fluctuate annually depending upon winter severity and available food sources. Annual survival rates increase with age (Reese 1980, Gelston and Wood 1982). Life expectancy in the wild may reach to over 25 years; however, the average is probably closer to 7 years (Reese 1980). In general, wintering distribution is similar to that of the breeding range. Mute swans are non-migratory in the Atlantic Flyway, but may undergo short local seasonal movements seeking open water and available food sources during winter weather.

Since 1986, the Atlantic Flyway population of mute swans has grown 118%, from 5,800 birds to over 12,600 swans. This growth is seen throughout the Flyway, especially in the Chesapeake Bay region (Maryland and Virginia) which has increased 1271.3%. This rapid growth rate in the Chesapeake Bay shows the potential growth rate that this invasive species could have throughout the Flyway. Breeding Bird Survey trend data from 1966-2003 indicate that mute swan populations have increased at an annual rate of 9.9% and 9.9% throughout the United States and the eastern region, respectively (Sauer et al. 2004). No Breeding Bird Survey data was available for mute swans in Georgia.

Based upon the need to coordinate mute swan management actions among state/provincial and Federal wildlife agencies to reduce swan numbers to desirable levels, the Atlantic Flyway has developed a Mute Swan Management Plan (Atlantic Flyway Council 2003). The goal of this management plan is to reduce mute swan populations in the Atlantic Flyway to levels that will minimize negative ecological impacts to wetland habitats and native migratory waterfowl and to prevent further expansion into unoccupied areas. Two specific management objectives identified in this plan is to reduce the population of mute swans to less than 3,000 birds by 2013 as measured by the Atlantic

Flyway Mid-summer Mute Swan Survey; and to prevent mute swans from further expanding their range and establishing new breeding populations.

In 1989, 26 mute swans were sighted in Georgia. At that time the majority occurred on privately owned ponds and lakes. At present, there are approximately 250 mute swans in Georgia and all are believed to reside on private lands (Atlantic Flyway Council 2003). These swans are a potential nucleus for a future feral population (Atlantic Flyway Council 2000). The only management strategy currently identified in Georgia is to limit mute swans to private ponds only, and prevent their establishment on public waters (Atlantic Flyway Council 2003),

1.3.2.1.6 Domestic and Feral Waterfowl

Many waterfowl of domestic or semi-wild genetic backgrounds have been released by humans into rural and urban environments; including numerous species of ducks, geese, and swans. Examples of domestic or feral waterfowl include but are not limited to Muscovy ducks, Pekin ducks, Rouen ducks, Cayuga ducks, Swedish ducks, Chinese geese, and Toulouse geese.

Selective breeding has resulted in the development of numerous domestic varieties of the mallard ducks that no longer exhibit the external characteristics or coloration of their wild mallard ancestors. An example of a feral duck is the "urban" mallard duck. The coloration of the feathers of urban ducks is highly variable and often does not resemble that of the wild mallard ducks. Urban mallard ducks in Georgia often display the following physical characteristics: male may be missing the white neck ring or the neck ring will be an inch wide instead of the narrower 1/4 inch wide ring found on wild mallards, males may have purple heads instead of green heads and heavily mottled breast feathers, females may be blond instead of mottled brown, the bills of females may be small and black instead of orange mottled with black, either sex may have white coloration on the wings, tail, or body feathers, and ducks may weigh more than wild ducks (2.5-3.5 pounds).

Domestic waterfowl have been purchased and released by property owners for their aesthetic value, but may not always remain at the release sites, thereby becoming feral. Feral waterfowl is defined as a domestic species of waterfowl that can not be linked to a specific ownership. Waterfowl releases are made in business parks, universities, wildlife management areas, parks, military bases, residential communities, and housing developments. Many times, these birds are released with no regard or understanding of the consequences or problems they can cause to the environment or the local community.

Federal law does not protect domestic varieties of waterfowl (Title 50, Code of Federal Regulations, Part 21), nor are domestic waterfowl specifically protected by State law in Georgia. Domestic and feral waterfowl in Georgia may be of mixed heritage and may show feather coloration of wild waterfowl. Some domestic and feral ducks are incapable of sustained flight, while some are incapable of flight at all due to hybridization. Domestic waterfowl may at times cross breed with migratory waterfowl species creating a hybrid cross breed (i.e. mallard X domestic duck, Canada goose X domestic goose). These types of hybrid waterfowl species will be taken in accordance definitions and regulations provided in CFR 50 Part 10 and 21.

Domestic ducks, geese and swans are non-indigenous species considered by many wildlife biologists and ornithologists to be an undesirable component of North American wild and native ecosystems. Any reduction in the number of these domestic waterfowl species could be considered a beneficial impact to other native bird species.

1.3.2.2 Historical Information

1.3.2.2.1 Resident Canada Geese

The Atlantic Flyway Council's Resident Canada Goose Management Plan (Atlantic Flyway Council 1999) contains a detailed history of resident geese in the flyway, and it is summarized and paraphrased here. Resident Canada

geese are distinctly different from Canada geese that nested in the Flyway historically. The original stock in pre-colonial times was primarily *B.c. canadensis* (Delacour 1954), but they were extirpated long ago. Canada goose populations were nearly eliminated in North America by unrestricted harvesting of eggs, commercial hunting, and draining of wetland habitat. Since then, Canada goose populations have rebounded with the enactment of harvest regulations and the creation of protective refuges and foraging landscapes. The present day population in Georgia was introduced and established during the 1970's and 1980's by the GADNR and various sportsmen's organizations. The geese used for restocking purposes were nuisance birds acquired from surrounding states. Over the next several years more birds were obtained from game breeders and through natural reproduction that enabled reintroduction efforts to occur throughout the state. A hunting season for resident Canada geese was established in 1990 in limited areas with a limit of 1 per season. Georgia has gradually increased goose hunting opportunities to the current statewide, 75 day season with a bag limit of 5 geese per day. During the 1980's the first nuisance complaints were received from landowners in Georgia.

1.3.2.2.2 Migratory Canada Geese

The original, pre-settlement, stock of Canada geese that occurred in the Atlantic Flyway were *B.c. canadensis* (Delacour 1954 in Atlantic Flyway Council 1999). Canada geese are endemic to North America, where they occur in each state of the United States (except Hawaii), each Province of Canada, and many States of Mexico. Most authorities currently recognize 11 subspecies of Canada geese, which differ primarily in body size and color (Bellrose 1980). Canada goose migrations may encompass up to 3,000 miles, like that of the Richardson's Canada goose (*B.c. hutchinsii*) which nests as far north as Baffin Island, Nunavut, Canada and winters as far south as the eastern States of Mexico. Migrant geese nest across the arctic, subartic, and boreal regions of Canada and Alaska and range in size from the 2-4 pound cackling Canada goose (*B.c. minima*) to the 7-10 pound dusky Canada goose (*B.c. occidentalis*). Today there are virtually no migratory Canada geese present in Georgia (Atlantic Flyway Council 1999).

1.3.2.2.3 Mallard Ducks

Resident mallards have bred in Georgia for several hundred years (Atlantic Flyway Council 1999). Over this period of time their population numbers have fluctuated, dramatically at times. During the first half of the 1900's mallards were most common in northeast and southeast Georgia. In the late 1940s and 1950s, Georgia's mallard population expanded as continental populations moved eastward. Mallards moved into the state in response to a large increase in the number of farm pond. They adapted to farm habitat and suburban environments, and some wintering mallards remained through the breeding season. Mallards that winter and nest in Georgia are classified as resident mallards.

1.3.2.2.4 Mute Swans

The mute swan is not native to North America and was introduced, from Europe, into the United States in the late 19th century near New York City. Feral breeding took place after 544 more individuals were introduced in the lower Hudson Valley in 1910 and on Long Island in 1912. In the eastern United States, scattered breeding now occurs from Massachusetts to Virginia (Master 1992). The earliest sighting of mute swans in Georgia was in 1989 (Atlantic Flyway Mute Swan Management Plan 2002). The mute swan was not recorded during the first years of the Breeding Bird Survey. Since 1986, the Atlantic Flyway population of feral mute swans has grown 118%, from 5,800 birds to over 12,600 swans (Atlantic Flyway Council 2000). Increases in mute swan populations may have an impact on native waterfowl species. These swans destroy large amounts of aquatic vegetation while feeding and building nests (Master 1992).

1.3.2.3 Waterfowl Hunting in Georgia

Table 3-Georgia Waterfowl Season and bag limits for 2003.

Common name	Scientific name	Season	Bag/Possession limit
Mallard	*Anas platyrhnchos*	Nov. 22-30 Dec. 6-Jan. 25	4 per person (no more than 2 hens) 8 in possession (no more than 4 hens)
Canada Goose	*Branta canadensis*	Sept. 20-28 Nov. 22-30 Dec. 6-Jan. 31	5 per person 10 in possession
Snow Goose (Lesser)	*Anser caerulescens caerulescens*	Nov. 22-30 Dec. 6-Jan. 31	5 per person 10 in possession

1.3.2.3.1 Resident and Migratory Canada Geese (2003-2004)

There are two distinct seasons for Canada goose hunting in Georgia; the early September season and the regular season. The early Canada goose season for all of Georgia is from September 20 - 28, (5 allowed daily, 10 in possession). The regular Canada goose season is from Nov.22 – Nov.28 and Dec.6-Jan.31 (5 daily, 10 in possession), see above table;

In 1990, the first legal hunt for resident Canada geese (restricted to certain regions in Georgia) was established. The season length was 8 days and the bag limit was 1 per season. In 1996, Georgia's season (extended throughout the state) increased by 8 days to a 15-day season with a 2-goose daily limit. Since then the hunting regulations have evolved into a 75-day hunting season with a 5-goose bag limit.

While these seasons have contributed in targeting harvest of resident geese, additional strategies are needed to effectively manage the resident goose population (Atlantic Flyway Council 1999). Resident geese also avoid hunting mortality through their extensive use of urban and suburban environments. Resident Canada goose harvest rates are not uniform throughout a large area such as a state. Harvest rates greater than 25% may occur during special seasons in some rural areas, while geese in urban-suburban areas may experience no harvest at all in some years (Atlantic Flyway Council 1999). In Georgia, harvest rates have somewhat remain stable during the past 5 years while populations trends have become increasing. See Table 4 and Figure 1 for harvest comparison and population estimates. Urban-suburban areas often provide exceptional goose habitat and allow geese to remain in "refuges" and avoid peak harvest periods (i.e., weekends). Geese that live near people also often benefit from the availability of food handouts. Urban-suburban geese however, are subjected to herbicides, pesticides, pollution, automobiles, illegal take, pets, and transmission of disease from domestic birds (U.S. Fish and Wildlife Service 2001). Non urban-suburban geese are also subject to these same affects, albeit at differing rates.

Table 4-Number of Canada geese harvested in Georgia, population estimates, and population trends for the fiscal years of 1998-2003 (G. Balkcom, GADNR 2004).

Year	Number of Reported Canada Geese Harvested by Hunters	Population Estimate	Population Trend
1998	9,022	44,374	Stable
1999	12,903	81,470	Stable
2000	6,732	42,586	Stable
2001	24,400	140,160	Increasing
2002	26,300	173,378	Increasing
2003	25,300	134,528	Increasing

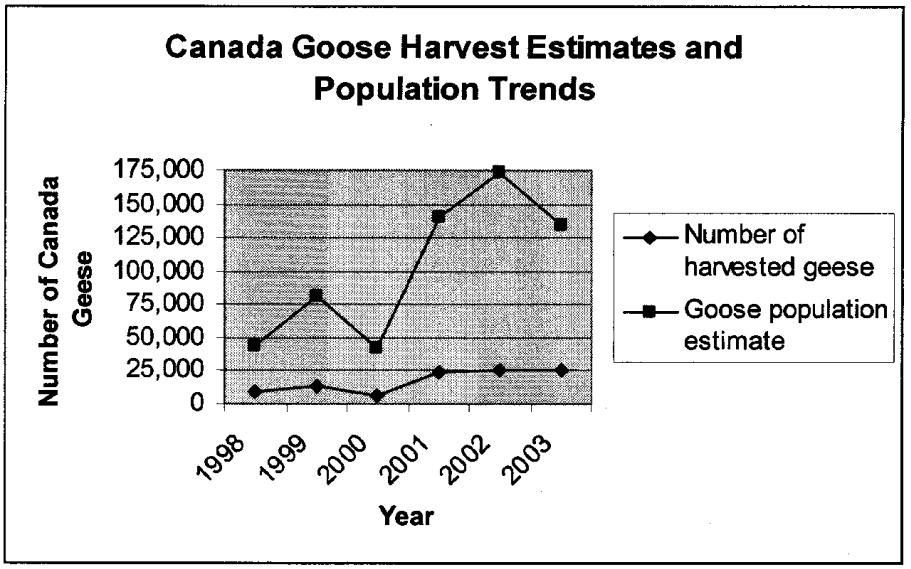

Figure 1

1.3.2.3.1.1 Migratory Snow Geese (2003-2004)

The migratory snow geese season coincides with the regular Canada goose season is from Nov.22 – Nov.28 and Dec.6-Jan.31 (5 daily, 10 in possession) (see table 3). Since populations and hunting success are so low for the state of Georgia, a population estimate and harvest number have not been established.

1.3.2.3.2 Mallard Ducks

Georgia has two distinct seasons that applies statewide for migratory ducks. Only the latter of the two seasons is targeted toward mallard ducks. This season runs from Nov. 22-Nov. 30 and Dec. 6-Jan. 25. The 2003 bag limit on ducks was 6 daily; may not include more than 4 mallards including 2 hens, 1 black duck, 1 pintail, 1 mottled duck, 1 fulvous tree duck, 2 wood ducks, 2 redheads, 4 scoters and 3 scaup. Possession limit is twice the daily bag limit (see table 3). As shown in Table 5, the hunter harvest of mallard ducks in Georgia has been relative stable over the past 4 years,

Table 5-Harvest Estimates for Mallard Ducks and all Duck Species in Georgia (2000-2003) (USFWS 2004).

Year	Number of Mallards Harvested	Number of all Duck Species Harvested
2000	16,899	136,283
2001	10,631	99,000
2002	14,434	81,100
2003	15,013	127,200

1.3.2.3.3 Mute Swans and Domestic or Feral Waterfowl

The take of feral ducks, geese (including cross-breeds) and swans is not regulated by any state regulations. These species can be taken during and outside of existing hunting seasons.

1.3.3 Waterfowl Damage and Conflicts

The management of waterfowl damage to protect human health, human safety, property, agriculture and natural resources invariably leads to a better quality of life for affected parties. WS is not legislatively mandated to protect quality of life, but it is accomplished, indirectly, as a secondary result of waterfowl damage management practices. In Georgia, the WS program received 108 (including Operational and Technical assistance projects) waterfowl damage-related requests for assistance for fiscal year 2003 (Table 6 and Table 7). Requests are categorized according to resource category (agriculture, property, natural resources, and human health and safety) and location. Damage to property (approximately 88% of requests), and human health and safety (approximately 11% of requests) are the most frequent types of damage reported. Requests for assistance with damage to agriculture and natural resources are less frequent. Most nuisance complaints are associated with suburban areas where waterfowl congregate on public or private ponds and forage on lawns and mowed areas associated with parks, beaches, golf courses, schools, business campuses, and residences. The major problems are associated with the impacts of feces and grazing damage to lawns and other areas (including sidewalks, driveways, swimming pools, etc.). Agricultural losses occur primarily in the late winter and spring. The major crops damaged are corn, soybeans, winter wheat, and improved pastures.

Table 6-Summation of WS Waterfowl Damage Management Technical Assistance Projects for the Fiscal Years of 1998-2003.

Waterfowl Species (Common Name)	Fiscal Year (Oct.1 – Sept 30)	Related Damage Ag-Damage to Agriculture HS-Damage to Health and Safety P-Damage to Property NR-Damage to Natural Resources T-Total	Total (Total Waterfowl Technical Assistance Projects)
Feral Ducks	1998	Ag-2; HS-0; P-0; NR-0 =T-2	76
Feral Geese		Ag-0; HS-1; P-0; NR-0=T-1	
Canada Geese		Ag-11; HS-11; P-50; NR-0=T-72	
Mallards		Ag-1; HS-0; P-0; NR-0=T-1	
Feral Ducks	1999	Ag-0; HS-1; P-7; NR-0 =T-8	122
Feral Geese		Ag-0; HS-0; P-1; NR-0=T-1	
Canada Geese		Ag-34; HS-y7; P-67; NR-0=T-108	
Mallards		Ag-0; HS-0; P-5; NR-0=T-5	
Feral Ducks	2000	Ag-0; HS-0; P-6; NR-0 =T-6	103
Feral Geese		Ag-0; HS-0; P-0; NR-0=T-0	
Canada Geese		Ag-9; HS-11; P-75; NR-0=T-95	
Mallards		Ag-0; HS-1; P-1; NR-0=T-2	
Feral Ducks	2001	Ag-2; HS-1; P-6; NR-0 =T-9	119
Feral Geese		Ag-0; HS-1; P-1; NR-0=T-2	
Canada Geese		Ag-9; HS-13; P-85; NR-0=T-107	
Mallards		Ag-0; HS-0; P-1; NR-0=T-1	
Feral Ducks	2002	Ag-0; HS-0; P-5; NR-0 =T-5	78
Feral Geese		Ag-0; HS-0; P-0; NR-0=T-0	
Canada Geese		Ag-4; HS-3; P-66; NR-0=T-73	
Mallards		Ag-0; HS-0; P-0; NR-0=T-0	
Feral Ducks	2003	Ag-0; HS-0; P-0; NR-0 =T-0	90
Feral Geese		Ag-0; HS-0; P-0; NR-0=T-0	
Canada Geese		Ag-1; HS-12; P-77; NR-0=T-90	
Mallards		Ag-0; HS-0; P-0; NR-0=T-0	

Table 7-Total number of WS Operational Waterfowl Damage Management Assistance Projects for the Fiscal Years of 1998-2003.

	Fiscal Year 1998	Fiscal Year 1999	Fiscal Year 2000	Fiscal Year 2001	Fiscal Year 2002	Fiscal Year 2003
Total Number of Operational Assistance Projects	16	22	28	26	19	20

1.3.3.1 Waterfowl Threats to Human Health

Waterfowl may impact human health. For instance, a foraging Canada goose defecates between 5.2 and 8.8 times per hour (Bedard and Gauthier 1986). Kear (1963 In Allan et al. 1995) recorded a maximum fecal deposition rate for Canada geese of 0.39 pounds per day (dry weight). Public swimming beaches, private ponds, and lakes can be affected by goose droppings. There are several pathogens involving waterfowl which may be contracted by humans, however, the risk of infection is believed low (Centers for Disease Control and Prevention (CDCP) 1998).

Cryptosporidiosis is a disease caused by the parasite *Cryptosporidium parvum* and was not known to cause disease in humans until as late as 1976 (CDCP 1998). A person can be infected by drinking contaminated water or direct contact with the droppings of infected animals (CDCP 1998). The public is advised to be careful when swimming in lakes, ponds, streams, and pools, and to avoid swallowing water while swimming (Colley 1996). The public is also advised to avoid touching stools of animals and to drink only safe water (Colley 1996). *Cryptosporidium* can cause gastrointestinal disorders (Virginia Department of Health 1995) and produce life threatening infections in immunocompromised and immunosuppressed people (Roffe 1987, Graczyk et al. 1998). Cryptosporidiosis is recognized as a disease with implications for human health (Smith et al. 1997). Canada geese in Maryland were shown with molecular techniques to disseminate infectious Cryptosporidium parvum oocysts through mechanical means in the environment (Graczyk et al. 1998).

Giardiasis (*Giardia lambia)* is an illness caused by a microscopic parasite that has become recognized as one of the most common causes of waterborne disease in humans in the United States during the last 15 years (CDCP 1999). Giardiasis is contracted by swallowing contaminated water or putting anything in your mouth that has touched the stool of an infected animal pr person, and causes diarrhea, cramps and nausea (CDCP 1999). Canada geese in Maryland were shown with molecular techniques to disseminate infectious Giardia sp. cysts in the environment (Graczyk et al. 1998).

Salmonella *(Salmonella spp.)* may be contracted by humans by handling materials soiled with bird feces (Stroud and Friend 1987). Salmonella causes gastrointestinal illness, including diarrhea.

Chlamydia psittaci, which can be present in diarrhetic feces of infected waterfowl, can be transmitted if it becomes airborne (Locke 1987). Severe cases of Chlamydiosis have occurred among wildlife biologists and others handling snow geese, ducks, and other birds (Wobeser and Brand 1982). Chlamydiosis can be fatal to humans if not treated with antibiotics. Waterfowl, herons, and rock doves (pigeons) are the most commonly infected wild birds in North America (Locke 1987).

Escherichia coli (*E. coli*) are fecal coliform bacteria associated with fecal material of warm blooded animals. There are over 200 specific serological types of E. coli and the majority are harmless (Sterritt and Lester 1988). Probably the best known serological type of *E. coli* is *E. coli* O157:H7, which is a harmful *E. coli* usually associated with cattle (Gallien and Hartung 1994). This was the rationale for testing public water supplies that was developed in the United States and Europe at the turn of the century to reduce the incidence of waterborne diseases. Regardless of whether the serological types of *E. coli* disseminated into watersheds by waterfowl are proven to be harmful to humans, it has been demonstrated that Canada geese can disseminate *E. coli* into the environment and result in elevated fecal coliform densities in the water column (Hussong et al. 1979). Many communities monitor water quality at swimming beaches and lakes, but lack the financial resources to pinpoint the source of elevated fecal coliform counts. When fecal coliform counts at swimming beaches exceed established standards the beaches are temporarily closed adversely affecting the human quality of life, even though they may not have been able to determine the serological type of the *E. coli*. Unfortunately, linking the elevated bacterial counts to frequency of waterfowl use and attributing the elevated levels to human health threats has been problematic until recently. Advances in genetic engineering have allowed microbiologists to match genetic code of coliform bacteria to specific animal species and link these animal sources of coliform bacteria to fecal contamination (Jamieson 1998, Simmons et al. 1995). Simmons et al. (1995) used genetic fingerprinting to link fecal contamination of small ponds on Fisherman Island, Virginia to waterfowl. Microbiologists were able to implicate waterfowl and gulls as the source of fecal coliform bacteria at the Kensico Watershed, a water supply for New York City (Klett et al. 1998). Also, fecal coliform bacteria counts coincided with the number of Canada geese and gulls roosting at the reservoir.

Roscoe (1999) conducted a survey to estimate the prevalence of pathogenic bacteria and protozoa in resident Canada geese in NJ, and found no *Salmonella* sp., *Shigella* sp., or *Yersinia* sp. isolated from any of the 500 Canada goose samples. However, he did report finding *Cryptosporidium* sp. in 49 (10%) of the 500 geese, and *Giardia* sp. in 75 (15%) of the geese. Additionally, the USGS (U.S. Geological Survey 2000) conducted field studies in NJ, VA, and MA to determine the presence of organisms that could cause disease in human exposed to feces of Canada geese at

sites with a history of high public use and daily use by geese. *Salmonella spp.*, *Listeria spp.*, *Chlamydia sp.*, and *Giardia spp.* were isolated from goose feces in New Jersey (U.S. Geological Survey 2000).

While transmission of disease or parasites from waterfowl to humans has not been well documented, the potential exists (Luechtefeld et al. 1980, Wobeser and Brand 1982, Hill and Grimes 1984, Pacha et al. 1988, Blandespoor and Reimink 1991, Graczyk et al. 1997, Saltoun, et al. 2000). In worst case scenarios, infections may even be life threatening for immunocompromised and immunosuppressed people (Roffe 1987, Virginia Department of Health 1995, Graczyk et al. 1998). Even though many people are concerned about disease transmission from feces, the probability of contracting disease from feces is believed to be small. Financial costs related to human health threats involving waterfowl may include testing of water for *coliform* bacteria, cleaning and sanitizing beaches regularly of feces, contacting and obtaining assistance from public health officials, and implementing non-lethal and lethal methods of wildlife damage management. WS recognizes and defers to the authority and expertise of local and state health officials in determining what does or does not constitute a threat to public health.

1.3.3.2 Need to Protect Human Safety from Waterfowl

Generally, bird collisions occur when aircraft are near the ground. From 1990-2001, approximately 56% of reported bird strikes to U.S. civil aviation occurred when the aircraft was at an altitude of 100 feet above ground level or less (Cleary et al. 2002). Additionally, 78% occurred under 900 feet above ground level and about 86% occurred under 2,000 feet above ground level (Cleary et al. 2002). From 1990-2001, birds were involved in more than 97% of the reported wildlife strikes to civil aircraft in the USA (Cleary et al. 2002).

Bird strikes cause an estimated seven fatalities involving civilian and military aircraft each year (Linnell et al. 1996). For the period 1990-2000, waterfowl (geese and ducks) comprise 11% of all bird-aircraft strikes to civil aviation reported to the FAA for which bird species or group was reported (Cleary et al. 2002). For the period 1990-2000, more than 50% of Canada goose-aircraft strikes resulted in damage to the aircraft, and 28.5% resulted in a negative effect on the flight (Cleary et al. 2002). For example, in 1995, a Boeing 707 E38 AWACS jet taking off from Elmendorf Air Force Base in Alaska ingested at least 13 geese into the number 1 and 2 engines and crashed, killing all 24 crew members. The Canada goose is the most massive bird (8-15 pounds) that is commonly struck by aircraft, and nationally, this species was responsible for a disproportionately large amount of damage to civil aircraft involved in strikes with wildlife during 1990-2000 (Cleary et al. 2000). Nationally, the resident Canada goose population probably represents the single most serious bird threat to aircraft safety at this time (Alge 1999 in Cleary et al. 2000).

Resident Canada geese are of particular concern to aviation because of their 1) large size (typically 8-10 lbs which exceeds the 4-lb bird certification standard for engines and airframes), 2) flocking behavior which increases the likelihood of multiple bird strikes, 3) attraction to airports for grazing, and 4) year-around presence in urban environments near airports (Seubert and Dolbeer 2004). From 1990-2003 approximately 824 Canada goose strikes were reported to the FAA in the United States. Canada geese represent 5% of all reported aircraft strikes in the United States (Seubert and Dolbeer 2004). From 1997-2003 over 600 bird strikes were reported to the FAA in Georgia with 10 of these strikes being reported as waterfowl (FAA National Wildlife Strike Database 2004). The number of bird strikes actually occurring is likely to be much greater, since it is estimated that only 20-25% of all bird strikes are reported (Conover et al. 1995, Dolbeer et al. 1995, Linnell et al. 1996, Linnell et al. 1999, Cleary et al. 2000).

WS receives requests for assistance regarding bird damage management at airports and military airbases in Georgia. These requests are considered serious because of the potential for loss of human life and because damage to aircraft can be extremely expensive. With the implementation of an Integrated Waterfowl Damage Management program in Georgia, WS could provide direct management and technical assistance at the request of any aviation facility in the State.

Waterfowl aggressively defend their nests, nesting areas, and young, and may attack or threaten pets, children, and adults (Smith et al. 1999, Atlantic Flyway Council 2003). Additionally, slipping hazards can be created by the buildup of feces from waterfowl on docks, walkways, and other foot traffic areas. Waterfowl straying into busy streets and highways can present traffic hazards and may result in accidents as vehicles try to avoid hitting the birds.

1.3.3.3 Need to Protect Property from Waterfowl

Waterfowl may cause damage to aircraft, landscaping, piers, yards, boats, beaches, shorelines, parks, golf courses, driveways, athletic fields, ponds, lakes, rafts, porches, patios, gardens, foot paths, swimming pools, play grounds, school grounds, and cemeteries. Damage reported through technical assistance generally is not verified by field investigation by WS. The majority of people that contact WS for assistance describe a general decline in their quality of life due to local overabundance of waterfowl. In many cases, people are unable to use and enjoy their own property, public parks, and other areas because of waterfowl feces. Costs associated with property damage include labor and disinfectants to clean and sanitize the area, loss of property use and resale value, loss of aesthetic value of plants, gardens, aquatic vegetation, and lawns where waterfowl feed and loaf, loss of customers or visitors irritated by having to walk on feces, and loss of time contacting wildlife management agencies on health and safety issues and damage management advice, and implementation of non-lethal and lethal wildlife management methods. The costs of reestablishing overgrazed lawns and cleaning waterfowl feces from sidewalks have been estimated at more than $60 per bird (Allan et at. 1995).

1.3.3.4 Need to Protect Agriculture from Waterfowl

The most common waterfowl damage to agriculture is primarily crop consumption (loss of the crop and revenue), but also consists of unacceptable accumulations of feces on horse pastures, trampling of wheat, and increased erosion and runoff from fields where the cover crop has been grazed. Canada geese graze a variety of crops, including alfalfa, barley, beans, corn, soybeans, wheat, rye, oats, spinach, and peanuts (Atlantic Flyway Council 1999). A single intense grazing event by Canada geese in fall, winter or spring can reduce the yield of winter wheat by 16-30% (Fledger et al. 1987), and reduce growth of rye plants by >40% (Conover 1988). However, some have reported that grazing by geese during the winter may increase rye or wheat seed yields (Clark and Jarvis 1978, Allen et al. 1985). During Federal Fiscal Years 2000-2003 a total of 23 requests for assistance were received by WS regarding waterfowl damage to agriculture in Georgia.

1.3.3.5 Need to Protect Natural Resources from Waterfowl

Soil erosion and sedimentation can cause damage to natural resources. Excessive numbers of waterfowl can cause damage to natural vegetation and remove bank vegetation resulting in erosion of the shoreline and soil sediments being carried by rainwater into lakes, ponds, and reservoirs. Overabundant resident Canada geese can negatively impact crops and habitats that are maintained as food and cover for migrant waterfowl and other wildlife. Mute swans can have detrimental impacts on wetland habitat and native waterfowl species (Atlantic Flyway Council 2003). Mute swans can consume on average 39% of their body weight daily and therefore can have devastating effect on the viability of aquatic plant beds. Competition for habitat makes mute swans a threat to native waterfowl. During the nesting season mute swans will vigorously defend nest and brood sites from intrusion by other bird species.

Nutrient loading has been found to increase in wetlands in proportion to increases in the numbers of roosting geese (Kitchell et al. 1999, Manny et al. 1994). In studying the relationship between bird density and phosphorus (P) and nitrogen (N) levels in Bosque Del Apache National Wildlife Refuge in New Mexico, Kitchell et al. (1999) found an increase in the concentration of both P and N correlated with an increase in bird density. Scherer et al. (undated) stated that waterfowl metabolize food very rapidly and most of the phosphorus contributed by bird feces probably originates from sources within a lake being studied. In addition, assimilation and defecation converted the phosphorus into a more soluble form and, therefore was considered a form of internal loading. Waterfowl have

contributed substantial amounts of P and N into lakes through feces creating excessive aquatic macrophyte growth and algae blooms (Scherer et al. undated) and accelerated eutrophication through nutrient loading (Harris et al. 1981).

Waterfowl are considered by the American Association of Wildlife Veterinarians (AAWV) as susceptible to and carriers of disease and parasites. Because of the potential threat to free-ranging waterfowl, the AAWV put forth the following resolution (AAWV, undated):

...wild and semi-domestic ducks, geese and swans are susceptible to and carriers of disease and parasites of free-ranging wild ducks, geese, and other birds;..."

...the AAWV encourages local authorities and state and federal agencies to cooperate to limit the population of waterfowl on urban water areas to prevent disease outbreaks in semi-domestic as well as free ranging ducks, geese and swans and discourages the practice of relocating nuisance or excess urban ducks, geese and swans to other parks or wildlife areas as a means of local population control."

1.4 WS RECORD KEEPING REGARDING REQUESTS FOR WATERFOWL DAMAGE MANAGEMENT ASSISTANCE

WS maintains a Management Information System (MIS) database to document assistance that the agency provides in addressing wildlife damage conflicts. MIS data is limited to information that is collected from people who have requested services or information from Wildlife Services. It does not include requests received or responded to by local, State or other Federal agencies, and it is not a complete database for all wildlife damage occurrences. The number of requests for assistance does not necessarily reflect the extent of need for action, but this data does provide an indication that needs exists.

The database includes, but not limited to, the following information: species of wildlife involved, the number of individuals involved in a damage situation; tools and methods used or recommended to alleviate the conflict; and the resource that is in need of protection. Table 6 and 7 provides a summary of waterfowl damage management projects completed by the Georgia WS program for Fiscal Years 1998-2003.

1.5 RELATIONSHIP OF THIS ENVIRONMENTAL ASSESSMENT TO OTHER ENVIRONMENTAL DOCUMENTS

WS conducted a NEPA process and developed a Final Environmental Impact Statement (FEIS) on the national APHIS/WS program (USDA 1997). The FEIS contains detailed discussions of potential environmental impacts from various wildlife damage management methods. Pertinent information available in the FEIS has been incorporated by reference into this EA. The FEIS may be obtained by contacting: USDA APHIS WS Operational Support Staff, 4700 River Rd., Unit 87, Riverdale, MD 20737-1234.

1.6 DECISIONS TO BE MADE

Based on the scope of this EA, the decisions to be made are:

- Should WS implement a Waterfowl Damage Management program in Georgia?
- If not, how should WS fulfill its legislative responsibilities for managing damage and conflicts associated with waterfowl in Georgia?
- Might the proposed WS program have significant impacts requiring preparation of an EIS?

1.7 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT ANALYSIS

1.7.1 Actions Analyzed

This EA evaluates waterfowl damage management by WS to protect human health, human safety, property, natural resources, and agriculture on private and public land statewide, whenever such management is requested from the WS program.

1.7.2 American Indian Lands and Tribes

Currently WS does not have any MOUs or signed agreements with any American Indian tribe in Georgia. If WS enters into an agreement with a tribe, this EA would be reviewed and supplemented if appropriate to insure compliance with NEPA.

1.7.3 Period for which this EA is Valid

This EA will remain valid until WS determines that new needs for action, changed conditions or new alternatives that have different environmental effects must be analyzed. At that time, this analysis and document will be reviewed and revised as necessary. This EA will be reviewed each year to ensure that it is complete and still appropriate to the scope of WS state waterfowl damage management activities.

1.7.4 Site Specificity

This EA analyzes the potential impacts of WS' waterfowl damage management activities and addresses activities on all lands in Georgia under MOU, Cooperative Agreement and in cooperation with the appropriate public land management agencies. It also addresses the impacts of waterfowl damage management activities on areas where additional agreements may be signed in the future. Because the proposed action is to reduce damage and because the program's goals and directives are to provide services when requested, within the constraints of available funding and workforce, it is conceivable that additional waterfowl damage management efforts could occur. Thus, this EA anticipates this potential expansion and analyzes the impacts of such efforts as part of the program.

Planning for the management of waterfowl damage must be viewed as being conceptually similar to federal or other agency actions whose missions are to stop or prevent adverse consequences from anticipated future events for which the actual sites and locations where they will occur are unknown but could be anywhere in a defined geographic area. Examples of such agencies and programs include fire and police departments, emergency clean-up organizations, insurance companies, etc. Although some of the sites where waterfowl damage will occur can be predicted, all specific locations or times where such damage will occur in any given year cannot be predicted. This EA emphasizes major issues as they relate to specific areas whenever possible, however, many issues apply wherever waterfowl damage and resulting management occurs, and are treated as such. The standard WS Decision Model (Slate et al. 1992) would be the site-specific procedure for individual actions conducted by WS in Georgia (see Chapter 3 for a description of the Decision Model and its application).

The analyses in this EA are intended to apply to any action that may occur *in any locale* and at *any time* within the analysis area. In this way, APHIS-WS believes it meets the intent of NEPA with regard to site-specific analysis and that this is the only practical way for WS to comply with NEPA and still be able to accomplish its mission.

1.7.5 Public Involvement/Notification

As part of this process, and as required by the Council on Environmental Quality (CEQ) and APHIS-NEPA implementing regulations, this document and its Decision are being made available to the public through "Notices of Availability" (NOA) published in local media and through direct mailings of NOA to parties that have specifically

requested to be notified. New issues or alternatives raised after publication of public notices will be fully considered to determine whether the EA and its Decision should be revisited and, if appropriate, revised.

1.8 AUTHORITY AND COMPLIANCE

1.8.1 Authority of Federal and State Agencies in Waterfowl Damage Management in Georgia

See Chapter 1 of USDA (1997) for a complete discussion of federal laws pertaining to WS.

1.8.1.1 WS Legislative Authority

The USDA is authorized by law to protect American agriculture and other resources from damage associated with wildlife. The primary statutory authority for the Wildlife Services program is the Act of 1931, as amended (7 U.S.C. 426-426c; 46 Stat. 1468), and the Rural Development, Agriculture, and Related Agencies Appropriations Act of 1988, Public Law 100-102, Dec. 27, 1987. Stat. 1329-1331 (7 U.S.C. 426c), and the Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act of 2001, Public Law 106-387, October 28, 2000. Stat. 1549 (Sec 767), which provides that:

> *The Secretary of Agriculture may conduct a program of wildlife services with respect to injurious animal species and take any action the Secretary considers necessary in conducting the program. The Secretary shall administer the program in a manner consistent with all of the wildlife services authorities in effect on the day before the date of the enactment of the Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act, 2001."*

Since 1931, with the changes in societal values, WS policies and programs place greater emphasis on the part of the Act discussing "*bringing (damage) under control*," rather than "*eradication*" and "*suppression*" of wildlife populations. In 1988, Congress strengthened the legislative authority of WS with the Rural Development, Agriculture, and Related Agencies Appropriations Act. This Act states, in part:

> *"That hereafter, the Secretary of Agriculture is authorized, except for urban rodent control, to conduct activities and to enter into agreements with states, local jurisdictions, individuals, and public and private agencies, organizations, and institutions in the control of nuisance mammals and birds and those mammal and bird species that are reservoirs for zoonotic diseases, and to deposit any money collected under any such agreement into the appropriation accounts that incur the costs to be available immediately and to remain available until expended for Animal Damage Control activities."*

1.8.1.2 U.S. Fish and Wildlife Service (USFWS)

The USFWS is responsible for managing and regulating take of bird species that are listed as migratory under the MBTA and those that are listed as threatened or endangered under the ESA. Under the permitting application process, the USFWS requires applicants to describe, prior non-lethal damage management, techniques that have been used.

The USFWS authority for action is based on the MBTA of 1918 (as amended), which implements treaties with the United States, Great Britain (for Canada), the United Mexican States, Japan, and the Soviet Union. Section 3 of this Act authorized the Secretary of Agriculture:

> *"From time to time, having due regard to the zones of temperature and distribution, abundance, economic value, breeding habits, and times and lines of migratory flight of such birds, to determine when, to what*

extent, if at all, and by what means, it is compatible with the terms of the convention to allow hunting, taking, capture, killing, possession, sale, purchase, shipment, transportation, carriage, or export of any such bird, or any part, nest, or egg thereof, and to adopt suitable regulations permitting and governing the same, in accordance with such determinations, which regulations shall become effective when approved by the President."

The authority of the Secretary of Agriculture, with respect to the Migratory Bird Treaty, was transferred to the Secretary of the Interior in 1939 pursuant to Reorganization Plan No. II. Section 4(f), 4 Fed. Reg. 2731, 53 Stat. 1433.

CFR 50 Subchapter C - The National Wildlife Refuge System - Part 30 - Feral Animals - Subpart B-30.11 - Control of feral animals states: (a) Feral animals, including horses, burros, cattle, swine, sheep, goats, reindeer, dogs, and cats, without ownership that have reverted to the wild from a domestic state may be taken by authorized federal or state personnel or by private persons operating under permit in accordance with applicable provisions of federal or state law or regulation.

1.8.1.3 Georgia Department of Natural Resources (GADNR)

The Georgia Department of Natural Resources' authority in wildlife management is given under Title 27, Chapters 1 - 5 of the Official Code of Georgia Annotated. This legislation covers general provisions; licenses, permits and stamps generally; wildlife generally; fish; and wild animals.

1.8.1.4 Georgia Department of Agriculture (GDA)

The Pesticide Division of GDA enforces state laws pertaining to the use and application of pesticides. Under the Georgia Pesticide Use and Application Act this section monitors the use of pesticides in a variety of pest management situations. It also licenses private and commercial pesticide applicators and pesticide contractors. Under the Georgia Pesticide Control Act the division licenses restricted use pesticide dealers and registers all pesticides for sale and distribution in the state of Georgia. No toxicants are currently used or registered for use in managing waterfowl or reducing waterfowl damage in Georgia.

The GDA currently has a MOU with WS, which establishes a cooperative relationship between WS and the GDA, outlines responsibilities, and sets forth annual objectives and goals of each agency for resolving wildlife damage management conflicts in Georgia.

1.8.2 Compliance with Other Federal Laws

Several other federal laws authorize, regulate, or otherwise affect WS wildlife damage management. WS complies with these laws, and consults and cooperates with other agencies as appropriate.

1.8.2.1 National Environmental Policy Act (NEPA)

WS prepares analyses of the environmental impacts of program activities to meet procedural requirements of the NEPA. This EA meets the NEPA requirement for the proposed action in Georgia. When WS direct management assistance is requested by another federal agency, NEPA compliance is the responsibility of the other federal agency. However, WS could agree to complete NEPA documentation at the request of the other federal agency.

1.8.2.2 Endangered Species Act (ESA)

It is federal policy, under the ESA, that all federal agencies shall seek to conserve T&E species and shall utilize their authorities in furtherance of the purposes of the Act (Sec.2(c)). WS conducts Section 7 consultations with the USFWS to use the expertise of the USFWS to ensure that "*any action authorized, funded or carried out by such an agency . . . is not likely to jeopardize the continued existence of any endangered or threatened species . . . Each agency shall use the best scientific and commercial data available*" (Sec.7(a)(2)). WS obtained a Biological Opinion (B.O.) from the U.S. Fish and Wildlife Service (USDI 1992) describing potential effects on T&E species and prescribing reasonable and prudent measures for avoiding jeopardy (USDA 1997, Appendix F).

1.8.2.3 Migratory Bird Treaty Act of 1918 (U.S.C. 703711: 40 Stat. 755), as amended

The MBTA provides USFWS regulatory authority to protect families of bird species that migrate outside the United States. The law prohibits the "*take*" of these species by any entity, unless permitted by USFWS; people can obtain permits to take migratory birds under this law that are causing damage to resources.

WS provides on-site assessments for persons experiencing migratory bird damage to obtain information on which to base damage management recommendations. Damage management recommendations could be in the form of technical assistance or operational assistance. In severe cases of migratory bird damage, WS provides recommendations to the USFWS for the issuance of depredation permits to private entities or other agencies. The ultimate responsibility for issuing such permits rests with the USFWS.

WS will obtain MBTA permits covering waterfowl damage management activities that involve the taking of species for which such permits are required in accordance with the MBTA and USFWS regulations, or will operate as a named agent on MBTA permits obtained by cooperators.

A recent court case involving mute swans held that the MBTA must provide protection to individual non-native species found within the United States that belong to families of birds already protected under the Act. As a result, many other species in addition to the mute swan became eligible for protection under the MBTA that had previously been excluded. Thus, the Migratory Bird Treaty Reform Act of 2004 was passed to clarify the original intent of the MBTA, the conservation and protection of migratory birds native to North America, and directed USFWS to establish a list of non-native bird species found in the United States. Species on this list, including mute swans, will not be afforded MBTA protection. Certain bird species in North America are not protected under the MBTA because neither the species nor their family was listed in the MBTA. All actions conducted in this EA will be in compliance with the regulations of the MBTA, as amended.

1.8.2.4 Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

FIFRA requires the registration, classification, and regulation of all pesticides used in the United States. The U.S. Environmental Protection Agency (EPA) is responsible for implementing and enforcing FIFRA. All chemical methods integrated into the WS program in Georgia are registered with and regulated by the EPA and Georgia Department of Agriculture, and used by WS in compliance with labeling procedures and requirements. No toxicants are currently used or registered for use in managing waterfowl or reducing waterfowl damage. There are several repellents that are registered for use in reducing waterfowl vegetation damage in Georgia. An example of one that is Methyl Anthranilate based is ReJeX-iT™. Two other repellents that are commonly used are AG-36™ and FlightControl™ (Antraquinone based repellent).

1.8.2.5 Investigational New Animal Drug (INAD)

The drug alpha chloralose (AC) has been used as a sedative for animals and is registered with the Food and Drug Administration (FDA) to capture waterfowl, coots, and pigeons. FDA approval for use under INAD (21 CFR, Part 511) authorized WS to use the drug as a non-lethal form of capture.

1.8.2.6 National Historic Preservation Act (NHPA) of 1966, as amended

The NHPA of 1966, and its implementing regulations (36 CFR 800), requires federal agencies to: 1) determine whether activities they propose constitute "undertakings" that has the potential to cause effects on historic properties and, 2) if so, to evaluate the effects of such undertakings on such historic resources and consult with the Advisory Council on Historic Preservation (i.e. State Historic Preservation Office, Tribal Historic Preservation Officers), as appropriate. WS actions on tribal lands are only conducted at the tribe's request and under signed agreement; thus, the tribes have control over any potential conflict with cultural resources on tribal properties.

Each of the waterfowl damage management methods described in Appendix B that might be used operationally by WS do not cause major ground disturbance, do not cause any physical destruction or damage to property, do not cause any alterations of property, wildlife habitat, or landscapes, and do not involve the sale, lease, or transfer of ownership of any property. In general, such methods also do not have the potential to introduce visual, atmospheric, or audible elements to areas in which they are used that could result in effects on the character or use of historic properties. Therefore, the methods that would be used by WS under the proposed action are not generally the types of activities that would have the potential to affect historic properties. If an individual activity with the potential to affect historic resources is planned under an alternative selected as a result of a decision on this EA, then site-specific consultation as required by Section 106 of the NHPA would be conducted as necessary.

There is potential for audible effects on the use and enjoyment of a historic property when methods such as propane exploders, pyrotechnics, firearms, or other noise-making methods are used at or in close proximity to such sites for purposes of hazing or removing nuisance birds. However, such methods would only be used at a historic site at the request of the owner or manager of the site to resolve a damage or nuisance problem, which means such use would be to benefit the historic property. A built-in mitigating factor for this issue is that virtually all of the methods involved would only have temporary effects on the audible nature of a site and can be ended at any time to restore the audible qualities of such sites to their original condition with no further adverse effects. Site-specific consultation as required by Section 106 of the NHPA would be conducted as necessary in those types of situations.

1.8.2.7 Coastal Zone Management Act of 1972, as amended (16 USC 1451-1464, Chapter 33; P.L. 92-583, October 27, 1972; 86 Stat. 1280).

This law established a voluntary national program within the Department of Commerce to encourage coastal states to develop and implement coastal zone management plans. Funds were authorized for cost-sharing grants to states to develop their programs. Subsequent to federal approval of their plans, grants would be awarded for implementation purposes. In order to be eligible for federal approval, each state's plan was required to define boundaries of the coastal zone, identify uses of the area to be regulated by the state, determine the mechanism (criteria, standards or regulations) for controlling such uses, and develop broad guidelines for priorities of uses within the coastal zone. In addition, this law established a system of criteria and standards for requiring that federal actions be conducted in a manner consistent with the federally approved plan. The standard for determining consistency varied depending on whether the federal action involved a permit, license, financial assistance, or a federally authorized activity. As appropriate, a consistency determination would be conducted by WS to assure management actions would be consistent with the State's Coastal Zone Management Program.

1.8.2.8 Environmental Justice and Executive Order 12898 "*Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations.*"

Executive Order 12898, promotes the fair treatment of people of all races, income levels and cultures with respect to the development, implementation and enforcement of environmental laws, regulations and policies. Environmental justice is the pursuit of equal justice and protection under the law for all environmental statutes and regulations without discrimination based on race, ethnicity, or socioeconomic status. Environmental Justice is a priority within

APHIS and WS. Executive Order 12898 requires federal agencies to make environmental justice part of their mission, and to identify and address disproportionately high and adverse human health and environmental effects of federal programs, policies and activities on minority and low-income persons or populations. APHIS implements Executive Order 12898 principally through its compliance with NEPA. All WS activities are evaluated for their impact on the human environment and compliance with Executive Order 12898.

WS personnel use only legal, effective, and environmentally safe wildlife damage management methods, tools, and approaches. All chemicals used by WS are regulated by the EPA through FIFRA, the Georgia Department of Agriculture, by MOUs with land managing agencies, and by WS Directives. Based on a thorough Risk Assessment, APHIS concluded that when WS program chemicals are used according to label directions, they are selective to target individuals or populations, and such use has negligible impacts on the environment (USDA 1997, Appendix P). The WS operational program properly disposes of any excess solid or hazardous waste. It is not anticipated that the proposed action would result in any adverse or disproportionate environmental impacts to minority and low-income persons or populations. In contrast, the proposed action may benefit minority or low-income populations by reducing bird damage such as threats to public health and safety. Additionally, the donation of processed goose meat products at no cost to food shelf operations within Georgia would be a benefit to the low income families or populations.

1.8.2.9 Protection of Children from Environmental Health and Safety Risks (Executive Order 13045)

Children may suffer disproportionately from environmental health and safety risks, including the development of their physical and mental status. Because WS makes it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children, WS has considered the impacts that this proposal might have on children. The proposed waterfowl damage management program would occur by using only legally available and approved methods where it is highly unlikely that children would be adversely affected. For these reasons, WS concludes that it would not create an environmental health or safety risk to children from implementing this proposed action. Additionally, since the proposed waterfowl damage management program is directed at reducing accumulations of feces, waterfowl aggression, denuding of landscaped vegetation, etc., at schools, public parks, playgrounds, private properties and other locations where children are sometimes present, it is expected that health and safety risks to children would be reduced.

1.8.2.10 Responsibilities of Federal Agencies to Protect Migratory Birds (Executive Order 13186)

Executive Order 13186 requires each Federal agency taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations, is directed to develop and implement, a MOU with the USFWS that shall promote the conservation of migratory bird populations. WS has developed a draft MOU with the USFWS as required by this EO and is currently waiting for USFWS approval. WS will abide by the MOU once it is finalized and signed by both parties.

1.8.2.11 The Native American Graves and Repatriation Act of 1990

The Native American Graves Protection and Repatriation Act requires federal agencies to notify the Secretary of the Department that manages the federal lands upon the discovery of Native American cultural items on federal or tribal lands. Federal projects would discontinue work until a reasonable effort has been made to protect the items and the proper authority has been notified.

1.8.2.12 Occupational Safety and Health Act of 1970

The Occupational Safety and Health Act of 1970 and its implementing regulations (29CFR1910) on sanitation standards states that, "Every enclosed workplace shall be so constructed, equipped, and maintained, so far as reasonably practical, as to prevent the entrance or harborage of rodents, insects, and other vermin. A continuing and effective extermination program shall be instituted where their presence is detected." This standard includes birds that may cause safety and health concerns at workplaces.

1.8.2.13 Executive Order 13112 of February 3, 1999

This Order prevents the introduction of invasive species and provides for their control to minimize the economic, ecological, and human health impacts that invasive species cause. Domestic waterfowl and mute swans are recognized as invasive species that have adverse economic, ecological, and human health impacts.

1.8.3 Compliance with Other State Laws

In Georgia, Canada geese, snow geese and mallards are classified as a protected game bird species, and are regulated by Georgia state law. Waterfowl hunting seasons in Georgia are regulated by the GADNR as described in Section 1.3.2.3. To manage damage associated with protected bird species, depredation permits issued by the USFWS are co-signed by the GADNR. Therefore, one depredation permit provides both federal and state authorization in Georgia.

Resident Canada geese are defined as migratory birds and fall under the jurisdiction of the USFWS. In 2002, the GADNR acquired a "Special Canada Goose Permit" (50 CFR 21.26) from the USFWS that authorizes the GADNR and their designated agents to carry out resident Canada goose control activities between March 11 and August 31. During these dates, this federal permit allows GADNR to issue permits to landowners to destroy nests and eggs, kill geese, or have them relocated. All other permits that are required outside of these dates are regulated and issued by the USFWS. Table 8 provides the number depredation permits issued to landowners by GADNR under the authority of this USFWS "Special Canada Goose Permit".

Table 8 - Number of resident Canada goose depredation permits issued to landowners by GADNR under the authority of the USFWS "Special Canada Goose Permit" from 2002-2004.

Year	Number of depredation permits
2002	17
2003	30
2004	41

2.0 CHAPTER 2: AFFECTED ENVIRONMENT AND ISSUES

Chapter 2 contains a discussion of issues that received detailed environmental impact analysis in Chapter 4 (Environmental Consequences) and issues not considered in detail, with rationale. Portions of the affected environment will be included in this chapter in the discussion of issues used to develop mitigation measures. Additional affected environments are incorporated into the discussion of the environmental impacts in Chapter 4 and the description of the current program in Chapter 3.

2.1 AFFECTED ENVIRONMENT

The areas of the proposed action include, but are not limited to, property on or adjacent to airports, golf courses, athletic fields, recreational areas, swimming beaches, parks, corporate complexes, subdivisions, businesses, industrial parks, schools, agricultural areas, wetlands, restoration sites, and cemeteries. The proposed action may be conducted on properties held in private, local, state or federal ownership.

2.2 ISSUES

The following issues have been identified as areas of concern requiring consideration in this EA. These will be analyzed in detail in Chapter 4:

I. Effects on Target Waterfowl Populations
II. Effectiveness of Wildlife Damage Management Methods
III. Effects on Aesthetic Values
IV. Humaneness and Animal Welfare Concerns of Methods Used by WS
V. Effects on Non-target Wildlife Species Populations, Including T&E Species

2.3 ISSUES ADDRESSED IN THE ANALYSIS OF ALTERNATIVES

2.3.1 Effects on Target Waterfowl Populations

A common concern among members of the public is whether wildlife damage management actions adversely affect the viability of target wildlife species populations. The target species analyzed in this EA are Canada geese, snow geese, mallards, mute swans, and domestic and feral waterfowl.

Impacts of West Nile virus on bird populations. West Nile (WN) virus has emerged in recent years in temperate regions of North America, with the first appearance of the virus in North America occurring in New York City in 1999 (MMWR 2002, Rappole et al. 2000). Since 1999 the virus has spread across the United States and was reported to occur in 44 states and the District of Columbia in 2002 (MMWR 2002). West Nile virus is typically transmitted between birds and mosquitoes. Mammals can become infected if bitten by an infected mosquito, but individuals in most species of mammals do not become ill from the virus. The most serious manifestation of the WN virus is fatal encephalitis in humans, horses, and birds. West Nile virus has been detected in dead bird species of at least 138 species, including waterfowl (CDC 2003). Although birds infected with WN virus can die or become ill, most infected birds do survive and may subsequently develop immunity to the virus (CDC 2003, Cornell University 2003). In some bird species, particularly Corvids (crows, blue jays, ravens, magpies), the virus causes disease (often fatal) in a large percentage of infected birds (Audubon 2003, CDC 2003, Cornell University 2003, MMWR 2002). In 2002, WN virus surveillance/monitoring programs revealed that Corvids accounted for 90% of the dead birds reported with crows representing the highest rate of infection (MMWR 2002). Large birds that live and die near humans (i.e. crows) have a greater likelihood of being discovered, therefore the reporting rates tend to be higher for these bird species and are a "good indicator" species for the presence of WV virus in a specific area (Cornell University 2003, Audubon 2003). According to US Geological Survey (USGS), National Wildlife Health Center (2003), information is not currently available to know whether or not WN virus is having an impact on bird

populations in North America. USGS states that it is not unusual for a new disease to cause high rates of infection or death because birds do not have the natural immunity to the infection. Furthermore, it is not known how long it will take for specific bird population to develop sufficient immunity to the virus. Surveys of wild birds completed in the last three years have shown that some birds have already acquired antibodies to the virus (USGS-WHC 2003). Based upon available Christmas Bird Counts and Breeding Bird Surveys, USGS-WHC (2003) states that there have been declines in observations of many local bird populations, however they do not know if the decline can be attributed to WN virus or to some other cause. A review of available crow population data by Audubon (2003) reveals that at least some local crow populations are suffering high WN virus related mortality, but crow numbers do not appear to be declining drastically across broad geographic areas. USGS does not anticipate that the commonly seen species, such as crows and blue jays, will be adversely affected by the virus to the point that these bird species will disappear from the U.S. (USGS-WHC 2003).

2.3.2 Effectiveness of Wildlife Damage Management Methods

Another common concern among members of the public is whether the methods of reducing waterfowl damage will be effective in reducing or alleviating the damage/conflict. The effectiveness of each alternative can be defined in terms of decreased potential for health risks; decreased human safety hazards; reduced property, agricultural, and natural resource damage; and improved quality of life.

2.3.3 Affects on Aesthetic Values

Aesthetics is the philosophy dealing with the nature of beauty, or the appreciation of beauty. Therefore, aesthetic values are subjective, and depend on what an observer regards as beautiful. These values are personal and vary from each individual.

Generally, wildlife is regarded as providing economic, recreational, and aesthetic benefits (Decker and Goff 1987), and the mere knowledge that wildlife exists is a positive benefit for many people. However, wildlife also may be responsible for adverse affects to people. Wildlife activities sometimes result in economic losses to agriculture and property damage. Wildlife collisions with aircrafts and automobiles, aggressive waterfowl behavior, and wild animals that may harbor diseases transmissible to humans also jeopardize human safety.

Wildlife populations provide a range of social and economic benefits (Decker and Goff 1987). These include direct benefits related to consumptive and non-consumptive use (e.g., wildlife related recreation, observation, harvest, sale), indirect benefits derived from vicarious wildlife related experiences (e.g., reading, television viewing), and the personal enjoyment of knowing wildlife exists and is a part of the stability of natural ecosystems (e.g., ecological, existence, bequest values) (Bishop 1987). Indirect benefits come in two forms: bequest and pure existence (Decker and Goff 1987). Bequest is providing for future generations and pure existence is the knowledge that the animals exist (Decker and Goff 1987). Positive values of wildlife would also include having an abundance of wildlife to view. However, the same wildlife populations that are generally appreciated may also create conflicts with land uses and human health and safety. In certain settings some species of wildlife can be regarded as a nuisance. Large numbers of waterfowl can reduce the aesthetic appearance and enjoyment of some activities and locations because of an excessive accumulation feces, waterfowl aggression associated with human injury, denuded vegetation, eroded stream banks, disruption of vehicle traffic, etc. In sum, aesthetics include those values people place on waterfowl, knowledge of their existence and roles in local ecosystems, ability to enjoy and use properties for their intended purpose without an excessive feces accumulation, and ability to enjoy the natural and landscaped vegetation of an area.

Public reaction varies among people and social groups because of the numerous philosophical, aesthetic, personal attitudes, values, and opinions concerned on the reduction of conflicts/problems between humans and wildlife. Population management methods (egg destruction, capture and relocation, capture and euthanize, and shooting) may provide relief from damage in certain situations where non-lethal methods were ineffective or impractical. Many people directly affected by damage to property and threats to human safety caused by waterfowl chose removal of

the birds from the property when the WAC has been exceeded. Some people believe that waterfowl should be captured and relocated to another area to alleviate damage or threats to human safety. Some people directly affected by the damage from waterfowl sometimes oppose removal of the birds regardless of the amount of damage. Individuals not directly affected by the harm or damage may be supportive, neutral, or totally opposed to removal of waterfowl from specific locations or sites. Some of the totally opposed people want WS to teach tolerance for waterfowl damage and threats to human health and safety, and that waterfowl should never be removed from their local ecosystem. Some of the people who oppose removal of waterfowl do so because of human affectionate bonds with individual birds. These human affectionate bonds are similar to attitudes of a pet owner and result in aesthetic enjoyment of the particular species.

Some wildlife habituates easily and lives in close proximity to humans. Some people in these situations feed wildlife and/or otherwise develop emotional attitudes toward the animals that result in aesthetic enjoyment. In addition, some people consider individual wild birds as "pets," or exhibit affection toward these animals. Examples would be people who visit a city park to feed waterfowl and homeowners who have bird feeders or bird houses. Many people do not develop emotional bonds with individual species, but experience aesthetic enjoyment from observing them.

Some property owners that have populations of waterfowl above their identified WAC are concerned about the negative aesthetic appearance of feces and property damage to landscaping and turf. Managers of golf courses, swimming beaches and athletic fields are particularly concerned because negative aesthetics can result in reduced public use.

The WS program in Georgia only conducts wildlife damage management at the request of the affected property owner or resource manager. If WS received requests from an individual or official for waterfowl damage management, WS would address the issues/concerns and consideration would be made to explain the reasons why the individual damage management actions would be necessary. Management actions would be carried out in a caring, humane, and professional manner.

2.3.4 Humaneness and Animal Welfare Concerns of Methods used by WS

Humaneness, in part, is a person's perception of harm or pain inflicted on an animal. People may perceive the humaneness of each action differently. For example, one may view a certain action as a demeaning method that initially harms the animal and the environment of which it coexist. On the parallel, one may view the same action as resolution that best alleviates the problem.

Research indicates that the public may be willing to accept lethal wildlife management methods if they are humane (i.e., minimize pain and suffering of the target animal) (Kellert 1993, Schwartz et al. 1997). The issue of humaneness and animal welfare, as it relates to the killing or capturing of wildlife is an important and complex concept. Wildlife damage management for societal benefits could be compatible with animal welfare concerns if ". . . *the reduction of pain, suffering, and unnecessary death is incorporated in the decision making process" (Schmidt 1989).* Suffering is described as a "*. . . highly unpleasant emotional response usually associated with pain and distress",* however, suffering "*. . . can occur without pain . . . ,*" and "*. . . pain can occur without suffering . . .* " (AVMA 1987). Because suffering carries with it the implication of a time frame, suffering is considered to be minimized where death is immediate (CDFG 1991) such as occurs with proper shooting.

Defining pain as a component in humaneness of WS methods is a greater challenge than that of suffering. Pain occurs in animals. Altered physiology and behavior can be indicators of pain, and the causes that elicit pain responses in humans would "*. . . probably be causes for pain in other animals . . .* " (AVMA 1987). Pain experienced by individual animals probably ranges from little or no pain to significant pain (CDFG 1991). One challenge with coping with this issue is how to achieve the least amount of animal suffering within the constraints of current technology and resources. Additionally, "*. . . neither medical or veterinary curricula explicitly address suffering or its relief*" (AVMA 1987, CDFG 1999).

WS has improved the selectivity and humaneness of management techniques through research and development. Research is continuing to bring new findings and products into practical use. Until new findings and products are found practical, a certain amount of animal suffering could occur when some waterfowl damage management methods are used.

WS personnel in Georgia are experienced and professional in their use of management methods. Management methods applied are as humane as possible under the constraints of current technology, workforce and funding. Mitigation measures and standard operating procedures used to maximize humaneness are listed in Chapter 3.

2.3.5 Effects on Non-target Wildlife Species Populations, Including T&E Species

WS and the public are concerned about the potential impact of damage management methods and activities on non-target species, particularly T&E species. WS's standard operating procedures include measures intended to mitigate or reduce the effects on non-target and T&E species populations and are presented in Chapter 3. Table 9 is a list of federal and state listed T&E Avian species of Georgia. See Appendix C for all federal and state listed T&E species of Georgia.

Table 9-Federal and State Threatened and Endangered Avian List for the State of Georgia.

Common name	Scientific Name	Federal Status
Bald Eagle	*Haliaeetus leucocephalus*	Threatened
Piping Plover	*Charadrius melodus*	Threatened
Wood Stork	*Mycteria americana*	Endangered
Roseate Tern	*Sterna dougallii dougallii*	Threatened
Red-cockaded Woodpecker	*Picoides borealis*	Endangered

Common name	Scientific Name	State Status
Ivory-billed Woodpecker	*Campephilus principalis*	Endangered
Piping Plover	*Charadrius melodus*	Threatened
Kirtland's Warbler	*Dendroica kirtlandii*	Endangered
Peregrine Falcon	*Falco peregrinus*	Endangered
Bald Eagle	*Haliaeetus leucocephalus*	Endangered
Wood Stork	*Mycteria americana*	Endangered
Red-cockaded Woodpecker	*Picoides borealis*	Endangered
Gull-billed Tern	*Sterna nilotica*	Threatened
Bachman's Warbler	*Vermivora bachmanii*	Endangered

2.4 ISSUES CONSIDERED BUT NOT IN DETAIL WITH RATIONALE

2.4.1 Appropriateness of Preparing an EA (Instead of an EIS) For Such a Large Area

Some individuals might question whether preparing an EA for an area as large as the State of Georgia would meet the NEPA requirements for site specificity. Wildlife damage management falls within the category of federal or other regulatory agency actions in which the exact timing or location of individual activities cannot usually be predicted well enough ahead of time to accurately describe such locations or times in an EA or EIS. The WS program is analogous to other agencies or entities with damage management missions such as fire and police departments, emergency cleanup organizations, insurance companies, etc. Although WS can predict some of the possible locations or types of situations and sites where some kinds of wildlife damage will occur, the program

cannot predict the specific locations or times at which affected resource owners will determine a damage problem has become intolerable to the point that they request assistance from WS. In addition, the WS program would not be able to prevent such damage in all areas where it might occur without resorting to destruction of wild animal populations over broad areas at a much more intensive level than would be desired by most people, including WS and state agencies. Such broad scale population management would also be impractical or impossible to achieve within WS policies and professional philosophies.

If a determination is made through this EA that the proposed action would have a significant environmental impact, then an EIS would be prepared. In terms of considering cumulative impacts, one EA analyzing impacts for the entire state provides a better analysis than multiple EA's covering smaller zones. In addition, the WS program in Georgia only conducts waterfowl damage management in a very small area of the State where damage is occurring or likely to occur.

2.4.2 Effects on Human Health from Consumption of Waterfowl

To reduce potential health risks associated with consuming waterfowl, all waterfowl donated for human consumption would be tested for exposure to organophosphate and carbamate insecticides, lead, mercury, arsenic, organochlorines, and organic chemicals prior to distribution. The entity selecting the capture/euthanize (and donation for charitable consumption) program would be responsible for all costs associated with legal and appropriate donation for human consumption.

The following steps will be implemented when waterfowl is donated for human consumption:

- Captured waterfowl which would be donated for human (charitable) donation by WS would typically be euthanized, processed by a poultry processing facility, tested for contaminants, and then transported legally to the food bank.
- All processed meat would be packaged, frozen and stored at the processing site until test results were received. Head, kidney and liver samples would be tested for exposure to organophosphate and carbamate insecticides, lead, mercury, arsenic, organochlorines, and organic chemicals. Tests, in most cases, would be conducted by the Southeastern Cooperative Wildlife Disease Study (SCWDS) in Athens, GA.
- Poultry processing facilities utilized for this process would be in compliance with existing USDA regulations pertaining to the processing and handling of fowl (turkeys, chickens, etc.). There are no Georgia state regulations that provide further guidance in the processing and distribution of waterfowl carcasses for consumption by people (charitable donation).

3.0 CHAPTER 3: ALTERNATIVES INCLUDING THE PROPOSED ACTION

Alternatives were developed for consideration using the WS Decision Model (Slate et al. 1992) as described in Chapter 2 (pages 20-35), Appendix J (Methods of Control), Appendix N (Examples of WS Decision Model), and Appendix P (Risk Assessment of Wildlife Damage Control Methods Used by USDA, Wildlife Services Program) of the ADC FEIS (USDA 1997).

Chapter 3 contains a discussion of the program alternatives, including those that will receive detailed environmental impacts analysis in Chapter 4 (Environmental Consequences), alternatives considered but not analyzed in detail, with rationale, and mitigation measures and SOP's for wildlife damage management techniques. Pertinent portions of the affected environment will be included in this chapter in the discussion of issues used to develop mitigation measures. Evaluation of the affected environments will be addressed in more detail in Chapter 4.

3.1 DESCRIPTION OF THE ALTERNATIVES

The No Action alternative is a procedural NEPA requirement (40 CFR 1502), is a viable and reasonable alternative that could be selected, and serves as a baseline for comparison with the other alternatives. The No Action alternative, as defined here, is consistent with the Council on Environmental Quality's (CEQ's) definition (CEQ 1981).

3.2 WATERFOWL DAMAGE MANAGEMENT STRATEGIES AND METHODOLOGIES AVAILABLE TO WS IN GEORGIA

The strategies and methodologies described below include those that could be used or recommended under Alternatives 1, 2, and 3. Alternative 4 would terminate both WS technical assistance and operational wildlife damage management WS. Appendix B is a more thorough description of the methods that could be used or recommended by WS.

Alternatives analyzed in detail are:

- Alternative 1: Integrated Wildlife Damage Management Program. (Proposed Action/No Action)
- Alternative 2: Technical Assistance Only.
- Alternative 3: Non-lethal Waterfowl Damage Management Only By WS.
- Alternative 4: No federal WS Waterfowl Damage Management.

3.2.1 Integrated Wildlife Damage Management (IWDM)

The most effective approach to resolving wildlife damage is to integrate the use of several methods simultaneously or sequentially. The philosophy behind IWDM is to implement the best combination of effective management methods in a cost-effective[1] manner while minimizing the potentially harmful effects on humans, target and non-target species, and the environment. IWDM may incorporate cultural practices (i.e., no feeding policies), habitat modification (i.e., exclusion), animal behavior modification (i.e., scaring), and removal of individual disrupting animals (i.e., relocation), local population reduction, or any combination of these, depending on the circumstances of the specific damage problem. WS considers the biology and behavior of the damaging species and other factors using the WS Decision Model (Slate et al 1992). The recommended strategy(ies) may include any combination of preventive and corrective actions that could be implemented by the requester, WS, or other agency personnel, as appropriate. Two strategies are available:

1 The cost of management may sometimes be secondary because of overriding environmental, legal, human health and safety, animal welfare, or other concerns

1. Preventive Damage Management
Preventive Damage Management is applying wildlife damage management strategies before damage occurs, based on historical problems and data. All non-lethal methodologies, whether applied by WS or resource owners, are employed to prevent damage from occurring and therefore fall under this heading. When requested, WS personnel provide information and conduct demonstrations, or take action to prevent additional losses from recurring. An example would be a cooperator installing and maintaining a fence and/or overhead wire grid system to reduce access of waterfowl to a retention pond or scaring waterfowl away from active runways.

2. Corrective Damage Management
Corrective damage management is applying wildlife damage management to stop or reduce current losses. As requested and appropriate, WS personnel provide information and conduct demonstrations, or take action to prevent additional losses from recurring. An example would be the removal of waterfowl during the summer molt using round-up techniques or the oiling of eggs during the nesting season. Often, this involves the lethal removal of individual animals.

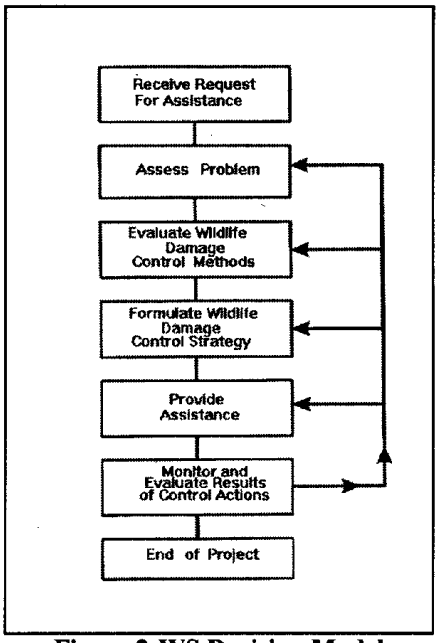

Figure 2-WS Decision Model

3.2.2 WS Decision Making

WS personnel use a thought process for evaluating and responding to damage complaints that is depicted by the WS Decision Model described by Slate et al. (1992) (Figure 1). WS personnel are frequently contacted after requesters have tried or considered non-lethal methods and found them to be impractical, too costly, or inadequate for reducing damage to an acceptable level. WS personnel assess the problem; evaluate the appropriateness and availability (legal and administrative) of strategies and methods based on biological, economic and social considerations. Following this evaluation, the methods deemed to be practical for the situation are developed into a management strategy. After the management strategy has been implemented, monitoring is conducted and evaluation continues to assess the effectiveness of the strategy. If the strategy is effective, the need for further management is ended. In terms of the WS Decision Model (Slate et al. 1992), most damage management efforts consist of continuous feedback between receiving the request and monitoring the results of the damage management strategy. The Decision Model is not necessarily a documented process, but is a mental problem-solving process common to most professions.

3.2.3 The IWDM Strategies that WS Employs

Technical Assistance Recommendations (implementation is the responsibility of the requestor):

Technical assistance is information, demonstrations, and advice on available and appropriate wildlife damage management methods. Technical assistance may require substantial effort by WS personnel in the decision making process, but the implementation of damage management actions is the responsibility of the requester. In some cases, WS provides supplies or materials that are of limited availability for non-WS entities to use. Technical assistance may be provided following a personal or telephone consultation, or during an on-site visit with the requester. Generally, several management strategies are described to the requester for short and long-term solutions to damage problems, these strategies are based on the level of risk, need, and the practicality of their application.

Under APHIS' NEPA Implementing Regulations and specific guidance for the WS program, WS technical assistance is categorically excluded from the need to prepare an EA or EIS. However, it is discussed in this EA because it is an important component of the IWDM approach to resolving wildlife damage problems.

Direct Damage Management Assistance (implementation is conducted or supervised by WS personnel):

Direct damage management assistance may be initiated when the problem cannot effectively be resolved through technical assistance alone, and when *Agreements for Control* or other comparable instruments provide for WS direct control damage management. The initial investigation defines the nature, history, extent of the problem, species or property directly and indirectly damaged species responsible for the damage, and methods that would be available to resolve the problem. Professional skills of WS personnel are often required to effectively resolve problems, especially if restricted use pesticides are necessary, or if the problem is complex. Direct damage management provided by WS in Georgia is provided on a cost-reimbursable (contract) basis.

Educational Efforts:

Education is an important element of WS program activities because wildlife damage management is about finding balance and coexistence between the needs of people and needs of wildlife. This is extremely challenging as nature has no balance, but rather, is in continual flux. In addition to the routine dissemination of recommendations and information to individuals or organizations sustaining damage, lectures and demonstrations are provided to producers, homeowners, state and county agents, and other interested groups. WS frequently cooperates with other agencies in education and public information efforts. Additionally, technical papers are presented at professional meetings and conferences so that WS personnel, other wildlife professionals, and the public are periodically updated on recent developments in damage management technology, laws, regulations, and agency policies.

Research and Development:

The National Wildlife Research Center (NWRC) functions as the research arm of WS by providing scientific information and development of methods for wildlife damage management that are effective and environmentally responsible. NWRC scientists work closely with wildlife managers, researchers, field specialists and others to develop and evaluate wildlife damage management techniques. NWRC research was instrumental in the development of Methyl Anthranilate. In addition, NWRC is currently testing new experimental drugs that inhibit bird reproduction. NWRC scientists have authored hundreds of scientific publications and reports, and are respected world-wide for their expertise in wildlife damage management.

3.2.4 Community Based Decision Making

Technical assistance provided by Wildlife Services to resource owners for decision making.

The WS program in Georgia follows the "co-managerial approach" to solve wildlife damage or conflicts as described by Decker and Chase (1997). Within this management model, WS provides technical assistance regarding the biology and ecology of waterfowl and effective, practical, and reasonable methods available to the local decision maker(s) to reduce wildlife damage. This includes non-lethal and lethal methods. WS and other state and federal wildlife or wildlife damage management agencies may facilitate discussions at local community meetings when resources are available. Resource owners and others directly affected by waterfowl damage or conflicts in Georgia have direct input into the resolution of such problems. They may implement management recommendations provided by WS or others, or may request management assistance from WS, other wildlife management agencies, local animal control agencies, or private businesses or organizations.

Local decision makers decide which effective methods should be used to solve wildlife-related conflicts. These decision makers include community leaders, private property owners/managers, and public property owners/managers.

Community decision makers

The decision maker for the local community with a homeowner or civic association would be the President or the Board's appointee. The President and Board are popularly elected residents of the local community who oversee the interests and business of the local community. This person would represent the local community's interest and make decisions for the local community or bring information back to a higher authority or the community for discussion and decision making. If no homeowner or civic association represents the affected resource then WS will provide technical assistance to the self or locally appointed decision maker. Identifying the decision maker for local business communities is more complex because the lease may not indicate whether the business must manage wildlife damage themselves, or seek approval to manage wildlife from the property owner or manager, or from a governing Board. WS would provide technical assistance and make recommendations for damage reduction to the local community or local business community decision maker(s). Direct control would be provided by WS only if requested by the local community decision maker, funding is provided, and if the requested direct control was compatible with WS recommendations.

Private property decision makers

The decision maker for private property is usually the property owner. WS would provide technical assistance and recommendations to this person. Direct control would be provided by WS if requested, funding provided, and the requested direct control was in line with WS recommendations.

Public property decision makers

The decision maker for local, state, or federal property would be the official responsible for or authorized to manage the public land to meet interests, goals and legal mandates for the property. WS would provide technical assistance to this person and recommendations to reduce damage. Direct control would be provided by WS if requested, funding provided, and the requested direct control was in line with WS recommendations.

Summary for community based decision making

The process for involving local communities and local stakeholders in the decisions for waterfowl damage management assures that local concerns are considered before individual damage management actions are taken.

3.2.5 Wildlife Damage Management Methods Available For Use or Recommendation by WS. (**Appendix B** contains detailed descriptions of waterfowl damage management methodologies)

Non-lethal methods

Property owner practices consist primarily of non-lethal preventive methods such as cultural methods[2] and habitat modification. Agricultural producer and property owner practices consist primarily of non-lethal preventive methods such as cultural methods[2] and habitat modification.

Animal behavior modification refers to tactics that alter the behavior of wildlife to reduce damages. Some but not all of these tactics include:

- Exclusion (fencing/overhead wires)
- Propane cannons (to scare waterfowl)
- Pyrotechnics (to scare waterfowl)
- Distress calls and sound producing devices (to scare waterfowl)

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[2] Generally involves modifications to the management of protected resources to reduce their vulnerability to wildlife damage.

- Visual repellents and scaring tactics
- Lasers (to scare waterfowl)
- Dogs (to scare waterfowl)

Nest destruction of the target species before eggs or young are in the nest.

Habitat/environmental modification to attract or repel certain waterfowl species.

Live traps are various types of traps designed to capture waterfowl. Some examples are clover traps, decoy traps, panel nets, rocket nets, hand nets, etc. Some of these devices are more effective during the summer molting season. Waterfowl live captured may be relocated or euthanized.

Alpha-chloralose is used as an immobilizing agent, which is a central nervous system depressant, and used to capture waterfowl. It is generally used in recreational and residential areas, such as swimming pools, shoreline residential areas, golf courses, or resorts. Alpha-chloralose is typically delivered as a well-contained bait in small quantities with minimal hazards to pets and humans; single bread or corn baits are fed directly to the target birds.

Methyl Anthranilate (MA) (artificial grape flavoring food additive) has been shown to be an effective repellent for many bird species, including waterfowl. It can be applied to turf or surface water or as a fog to repel birds from small areas.

Anthraquinone is a chemical bird repellent that could be used to reduce feeding activity on airfields and other turf applications. Antraquinone is a bio-pesticide that is non-lethal and works by causing a negative response to feeding in the treated area (Avery et al. 1997).

Lethal Methods

Shooting is the selective removal of target species by shooting with an air rifle, shotgun, or rifle. Shooting a few individuals from a larger flock can reinforce birds' fear of harassment techniques.

Cervical dislocation is sometimes used to euthanize birds that are live captured. AVMA approves this technique as humane method of euthanasia and states that cervical dislocation when properly executed is a humane technique for euthanasia of poultry and of small birds (Beaver et al. 2001).

Sport hunting is sometimes recommended when target species can be legally hunted.

Egg treatment/destruction is the practice of ceasing the development of the egg prior to hatching (egg oiling, chilling, shaking, puncturing); physically breaking eggs; or directly removing eggs from a nest and destroying them.

Carbon dioxide (CO_2) gas is an AVMA approved euthanasia method (Beaver et al. 2001) which is sometimes used to euthanize birds which are captured in live traps or by chemical immobilization and when relocation is not a feasible option. Live animals are placed in a container or chamber into which CO_2 gas is released. The animals quickly expire after inhaling the gas.

Capture and Euthanize is the most efficient way to reduce the size of resident waterfowl population is to increase mortality among adult waterfowl. Waterfowl that are captured and euthanized would be buried, incinerated, or processed for charitable donation.

3.2.6 Examples of Waterfowl Damage Management Projects

Nest/Egg Treatments
Nest/egg treatment has been recommended as part of the GA WS technical assistance program. Nest treatments include visiting the site during the nesting season of targeted species and removing/destroying the nest/eggs. Nest/egg treatment projects are most commonly conducted in public recreation areas, golf courses, and industrial facilities. The typical egg treatment method that is recommended by GA WS is oiling. Oiling involves marking each egg, in the nest, and spreading a few drops of vegetable oil on the entire surface of the egg. The oiled eggs are returned to the nest until the completion of the project when they are removed and disposed of in accordance with state and federal laws.

Although this technique has not been used operationally by Georgia WS, if this method is used in the future GA WS will adhere to the following protocol: 1) visiting the nests every 7-10 days for a 6-8 week period (last week of March to middle of May); and 2) WS will treat only those eggs that are less than 14 days old.

Dog Harassment
Dog harassment of waterfowl has not been directly used by the GA WS program, but is a common practice recommended through WS technical assistance to private individuals who have the ability to use dogs. Dog harassment is most effective in areas with no water bodies or with single, small (less than 2 acres) water bodies. This technique requires an ongoing program augmented with other waterfowl control techniques. Dog harassment projects are most commonly conducted in public recreation areas, golf courses, and industrial facilities. The procedure includes using dogs such as border collies or Labradors to encourage waterfowl to leave an area. Dog harassment usually occurs after the nesting season but before post-nuptual molt and then again after the molt and into the fall. GA WS recommends the cooperator to visit each site three days a week. Dog harassment is recommended and would only be conducted by WS in areas where egg treatment has been done in order to reduce the possibility of young being present during harassment. GA WS also emphasizes dog harassment activities during the resident Canada goose hunting season.

Waterfowl Round-ups
Waterfowl round-ups by GA WS have included using panel nets or drive traps to capture and relocate resident Canada geese during post-nuptial molt. In Georgia, this capturing method is generally used between the last two weeks in June and the first two weeks in July. Once the birds are in the traps they are humanely caught and transferred to waterfowl crates for relocation. In cooperation with the GADNR, geese are relocated to locations that are greater than 100 miles away from the capture sites. Relocation areas generally occur on privately owned land. To discourage the return of nuisance waterfowl to capture sites the wings of relocated waterfowl are clipped. Waterfowl with clipped wings are able to fly after their next molting.

In cooperation with GADNR, Georgia WS bands most of the Canada geese captured during waterfowl roundups. The banding data is transferred to GADNR and is filed at Georgia WS for band return interpretation. Table 10 and Figure 3 summarizes the number of WS Direct Control projects and number of Canada geese Captured/Relocated (Cage Trap, Waterfowl Round-up method) for the Fiscal years of 1998-2004.

Table 10 -Total number of Canada goose Capture/Relocate Direct Control Projects conducted by WS in Georgia during the summer molting seasons of 1998-2004.

	Year 1998	Year 1999	Year 2000	Year 2001	Year 2002	Year 2003	Year 2004
Total Number of Projects	13	18	18	22	19	16	40
Total Number of Cage Captured/Released Canada Geese	668	616	693	902	1016	898	1745

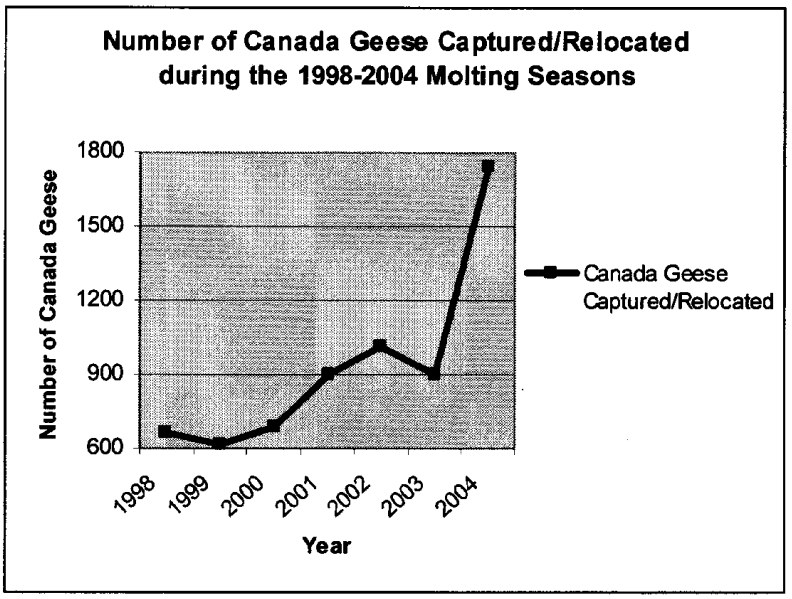

Figure 3

3.3 ALTERNATIVES ANALYZED IN DETAIL IN CHAPTER 4

3.3.1 Alternative 1: Integrated Wildlife Damage Management (Proposed Action/No Action)

The proposed action is for the WS to continue to implement an Integrated Waterfowl Damage Management program that responds to requests for waterfowl damage management to protect property, agricultural resources, natural resources, human health, and human safety in Georgia. Requests for assistance may occur anywhere and anytime throughout the state. An IWDM approach would be implemented which would allow the use of legal techniques and methods, used singly or in combination, to meet requestor needs for reducing conflicts with waterfowl. Cooperators requesting assistance would be provided with information regarding the use of effective non-lethal and lethal techniques. Non-lethal methods recommended and used by WS may include resource management, physical exclusion, relocation, and deterrents. Lethal methods recommended and used by WS may include nest and egg treatment/destruction, live capture and transportation to an approved poultry processing facility, live capture and euthanasia, and/or shooting. In many situations, the implementation of non-lethal methods such as habitat alteration, repellents, and exclusion type barriers would be the responsibility of the requestor to implement. Waterfowl damage management by WS would be conducted in Georgia, when requested, on private and public property, facilities, and housings where a need exists and pursuant to an *Agreement for Control.*

The proposed program conducted by WS in GA would continue to be conducted pursuant to applicable laws and regulations authorizing take of waterfowl and their nest and eggs, developed through partnerships among WS, the USFWS, and the GADNR, and as requested by and through coordination with requesters of assistance. All management actions would comply with appropriate federal, state, and local laws.

3.3.2 Alternative 2: Technical Assistance Only

This alternative would not allow for WS operational waterfowl damage management in Georgia. WS would only provide technical assistance and make recommendations when requested. Producers, property owners, agency personnel, or others could conduct waterfowl damage management using any legal lethal or non-lethal method that is available to them. Currently, alpha-chloralose is only available for use by WS employees. Therefore, use of this chemical by private individuals would be illegal and unavailable for use. Appendix B describes a number of methods that could be employed by private individuals or other agencies after receiving technical assistance advice under this alternative.

3.3.3 Alternative 3: Non-lethal Waterfowl Damage Management Only by WS.

This alternative would require WS to use or recommend non-lethal methods only to resolve waterfowl damage problems. Persons receiving technical assistance could still employ lethal methods that were available to them. Currently, alpha-chloralose is only available for use by WS employees. Therefore, use of this chemical by private individuals would be illegal. Appendix B describes a number of non-lethal methods available for use by WS under this alternative.

3.3.4 Alternative 4: No Federal WS Waterfowl Damage Management

This alternative would eliminate WS involvement in waterfowl damage management in Georgia. WS would not provide direct operational or technical assistance and requesters of WS services would conduct WDM without WS input. Information on waterfowl damage management methods may be available to producers and property owners through other sources such as USDA Agricultural Extension Service offices, USFWS, universities, or pest control organizations. Alpha-chloralose is only available for use by WS employees. Therefore, use of this chemical by private individuals would be illegal and unavailable for use.

3.4 ALTERNATIVES ELIMINATED FROM FURTHER DISCUSSION WITH RATIONALE

3.4.1 Non-lethal Methods Implemented Before Lethal Methods

This alternative is similar to Alternative 1 except that WS personnel would be required to always recommend or use non-lethal methods prior to recommending or using lethal methods to reduce waterfowl damage. Both technical assistance and direct damage management would be provided in the context of a modified IWDM approach. The Proposed Action recognizes non-lethal methods as an important dimension of IWDM. Alternative 1 gives them first consideration in the formulation of each management strategy, and recommends or uses them when practical before recommending or using lethal methods. However, the important distinction between the Non-lethal Methods First Alternative and the Proposed Alternative is that the former alternative would require that all non-lethal methods be used before any lethal methods are recommended our used.

While the humaneness of the non-lethal management methods under this alternative would be comparable to the Proposed Program Alternative, the extra harassment caused by the required use of methods that may be ineffective could be considered less humane. As local waterfowl populations increase, the number of areas negatively affected by these birds would increase, and greater numbers of birds would be expected to congregate at sites where non-lethal management efforts were not effective. This may ultimately result in a greater number of waterfowl being killed to achieve the local WAC than if lethal management were immediately implemented at problem locations (Manuwal 1989). Once lethal measures were implemented, waterfowl damage would be expected to drop relative to the reduction in localized population of waterfowl causing damage.

Since in many situations this alternative would result in greater numbers of waterfowl being killed to achieve the local WAC, at a greater cost to the requester, and result in a delay in reaching the local WAC in comparison to the Proposed Alternative, the Non-lethal Methods Implemented Before Lethal Methods Alternative is removed from further discussion in this document.

3.5 Mitigation and Standard Operating Procedures for Wildlife Damage Management Techniques

3.5.1 Mitigation in Standard Operating Procedures

Mitigation measures are any features of an action that serve to prevent, reduce, or compensate for impacts that otherwise might result from that action. The current WS program, nationwide and in Georgia, uses many such mitigation measures and these are discussed in detail in Chapter 5 of USDA (1997). Some key mitigating measures pertinent to the proposed action and alternatives that are incorporated into WS's standard operating procedures include:

- The WS Decision Model would be used to identify effective wildlife damage management strategies and their impacts (Slate et al. 1992).
- Reasonable and prudent measures or alternatives would be identified through consultation with the USFWS and are implemented to avoid impacts to T&E species.

Some additional mitigating factors specific to the proposed program include:

- Management actions would be directed toward localized populations or groups of target species and/or individual offending members of those species.
- WS uses waterfowl damage management devices and conducts activities for which the risk of hazards to public safety and hazard to the environment have been determined to be low according to a formal risk assessment (USDA 1997, Appendix P). Where such activities are conducted on private lands or other lands of restricted public access, the risk of hazard to the public is even further reduced.

3.5.2 Additional Mitigation Specific to the Issues

The following is a summary of additional mitigation measures that are specific to the issues listed in Chapter 2 of this document.

3.5.2.1 Effects on Target Species Populations

- Waterfowl damage management is directed to resolve waterfowl damage problems by taking action against individual problem birds, or local populations or groups, not by attempting to eradicate or reduce waterfowl populations in the entire area or region.
- To ensure that methods of live-capturing waterfowl result in minimal pain, which could be measured as physical injury (e.g., bleeding, broken wing), captured birds would be watered and feed as necessary, not overcrowded for transportation, and placed in shaded areas to reduce overheating.
- WS take is monitored by comparing numbers of birds killed with overall populations or trends in populations.

3.5.2.2 Effects on Non-target Species Populations Including T&E Species

- WS personnel are trained and experienced to select the most appropriate method for taking problem animals and excluding non-target wildlife.
- Observations are made to determine if non-target or T&E species would be at significant risk from waterfowl damage management activities.
- WS has consulted with the USFWS regarding potential impacts of damage management methods on T&E species. WS abides by reasonable and prudent alternatives (RPAs) and/or reasonable and prudent measures (RPMs) established as a result of that consultation. For the full context of the Biological Opinion see Appendix F of USDA (1997).

4.0 CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

Chapter 4 provides information needed for making informed decisions in selecting the appropriate alternative for meeting the purpose of the proposed action. The chapter analyzes the environmental consequences of each alternative in relation to the issues identified for detailed analysis in Chapter 2. This section analyzes the environmental consequences of each alternative in comparison with the No Action alternative to determine if the real or potential effects would be greater, lesser, or the same.

The following resource values within the State are not expected to be significantly impacted by any of the alternatives analyzed: soils, geology, minerals, water quality/quantity, flood plains, wetlands, visual resources, air quality, prime and unique farmlands, aquatic resources, timber, and range. These resources will not be analyzed further.

Cumulative Effects: Discussed in relationship to each of the alternatives analyzed, with emphasis on potential cumulative effects from methods employed, and including summary analyses of potential cumulative impacts to target and non-target species, including threatened and endangered species.

Irreversible and Irretrievable Commitments of Resources: Other than minor uses of fuels for motor vehicles and other materials, there are no irreversible or irretrievable commitments of resources.

Effects on sites or resources protected under the National Historic Preservation Act: WS waterfowl damage management actions are not undertakings that could adversely affect historic resources (See Section 1.8.2.6).

4.1 ENVIRONMENTAL CONSEQUENCES FOR ISSUES ANALYZED IN DETAIL

4.1.1 Effects on Target Waterfowl Populations

Analysis of this issue is limited to those species killed during WS waterfowl damage management actions. The analysis for magnitude of impact generally follows the process described in Chapter 4 of USDA (1997). Magnitude is described in USDA (1997) as " . . . *a measure of the number of animals killed in relation to their abundance.*" Magnitude may be determined either quantitatively or qualitatively. Quantitative determinations are based on population estimates, allowable harvest levels, and actual harvest data. Qualitative determinations are based on population trends and harvest data when available. Generally, WS only conducts damage management on species whose population densities are high and usually only after they have caused damage.

A common concern among members of the public is whether wildlife damage management actions will adversely affect the viability of target species populations. WS maintains ongoing contact with USFWS and the GADNR and submits annual migratory bird activity reports of activities to both agencies. The USFWS monitors the total take of waterfowl from all sources and factors in survival rates from predation, disease, etc. Ongoing contact with USFWS and the GADNR assures local, state and regional knowledge of wildlife population trends. While local populations of waterfowl may be reduced, compliance with applicable state and federal laws and regulations authorizing take of waterfowl and their nest and eggs, will ensure that the regional and statewide population will not be adversely affected. Canada geese, mallard ducks, mute swans, snow geese, and domestic or feral waterfowl are the target species for analysis in this EA.

Table 11-Number of Waterfowl Species taken by GA WS and methods used.

Waterfowl Species (Common Name)	Fiscal year	Non-Chemical Methods (R-released, E-Euthanized) CT-Cage Traps S-Shooting NCO-Non-chemical other	Chemical Methods (R-released, E-Euthanized) AC-Alpha Chloralose	Total (Total Waterfowl Species taken)
Feral Ducks	1998	0	AC(R)-29, AC(E)-83	112
Feral Geese		S(E)-1	0	1
Canada Geese		CT(R)-668, NCO(R)-1, S(E)-10	AC(R)-23	702
Mallards		0	0	0
Feral Ducks	1999	0	AC(R)-98, AC(E)-11	109
Feral Geese		0	AC(R)-9	9
Canada Geese		CT(R)-616	AC(R)-58, AC(E)-1	675
Mallards		0	0	0
Feral Ducks	2000	0	AC(R)-17	17
Feral Geese		0	AC(E)-2	2
Canada Geese		CT(R)-693	AC(R)-37, AC(E)-5	735
Mallards		0	0	0
Feral Ducks	2001	0	AC(R)-7, AC(E)-50	57
Feral Geese		0	0	0
Canada Geese		CT(R)-902, S(E)-5	AC(R)-100	1007
Mallards		0	AC(R)-53	53
Feral Ducks	2002	0	AC(R)-25, AC(E)-42	67
Feral Geese		0	0	0
Canada Geese		CT(R)-1016, NCO(R)-20	AC(R)-62	1098
Mallards		0	0	0
Feral Ducks	2003	0	AC(E)-30	30
Feral Geese		0	AC(R)-86, AC(E)-60	146
Canada Geese		CT(R)-898	AC(R)-42	940
Mallards		0	0	0

4.1.1.1 Alternative 1: Integrated Wildlife Damage Management Program (Proposed Action/No Action)

Resident Canada Geese

As described in Section 1.3, in 2003, the population of resident Canada geese in Georgia was estimated to be approximately 134,528 geese. Cumulative impacts of the proposed action on resident Canada geese are based upon the anticipated WS take, hunter harvest, and authorized take by other (non-WS) entities (farmers, municipalities, homeowners associations, etc.). The potential take of resident Canada geese by WS is expected to have no negative cumulative impact on the statewide or flyway resident Canada goose population.

Since 1998, WS has lethally removed a total of 21 resident Canada geese (Table 11). Based upon past requests for WS assistance and an anticipated increase in future requests for services, WS anticipates that no more than 1.5% (currently 2,018 birds) of the resident Canada goose population would likely be killed annually by WS in Georgia under the proposed action . During the 2003 Canada goose hunting season the harvest of Canada geese in Georgia was estimated at 25,300 geese (GADNR). Based upon information from GADNR most the geese harvested by hunters are likely resident birds since a minimal number of migratory geese pass through the state (G. Balkcom,

GADNR 2004). For Calendar Year 2003 (January 1 through December 31 2003) 41 resident Canada geese were taken under depredation permits by entities other than WS.

Using the 2003 hunter harvest (using the assumption that all birds taken by hunters are resident geese), USFWS permitted take, WS anticipated lethal take of no more than 1.5% of the State's resident Canada goose population per year, and an increasing population trend, the magnitude of WS impacts on the resident Canada goose population is considered to be very low. Furthermore this cumulative take would contribute positively to the state and Atlantic Flyway Council's resident goose population management objective of reduction from the current level (134,528 geese) to approximately 30,000 geese in Georgia.

While local populations of resident Canada geese deemed above the WAC by the property owner or local community may be reduced, applicable state and federal laws and regulations authorizing take of Canada geese and their nest and eggs, including the USFWS and GADNR permitting processes, would ensure that the statewide population would not be reduced below the state and Atlantic Flyway population goal of 30,000 resident Canada geese (Atlantic Flyway Council 1999).

Migratory Canada geese

Cumulative impacts of the proposed action on migratory Canada geese are based upon the anticipated WS take, hunter harvest, and authorized take by other (non-WS) entities. Since 1998, WS has lethally taken no migratory Canada geese in Georgia. All of WS lethal Canada goose damage management activities have taken place during the months when migratory geese are not present in Georgia (April-September). Most if not all of WS Canada goose damage management activities are targeted towards the resident Canada goose population. Based upon past requests for WS assistance and an anticipated increase in future requests for services, WS anticipates that no more than 100 migratory Canada geese would be killed by WS annually under the proposed action. During the 2003 Canada goose hunting season the harvest of Canada geese in Georgia was estimated at 25,300 geese (GADNR). Based upon information from GADNR (G. Balkcom, GADNR 2004) most the geese harvested by hunters are likely resident birds since a minimal number of migratory geese pass through the state. For Calendar Year 2003 (January 1 through December 31 2003), no migratory Canada geese were taken under depredation permits in Georgia by WS or non-WS entities.

Using the 2003 hunter harvest (using the assumption that the majority of the birds taken by hunters are resident geese), USFWS permitted take, WS anticipated lethal take of no more than 100 geese per year, and population trend data (see Section 1.3.2), the magnitude of WS impacts on the migratory Canada goose populations is considered to be very low.

While local populations of migratory Canada geese deemed above the WAC by the landowner or local community may be reduced, applicable state and federal laws and regulations authorizing take of Canada geese, including the USFWS and the GADNR permitting processes, under which management actions would be implemented would ensure that the statewide and flyway population would not be reduced below state and Atlantic Flyway population goals and objectives. Therefore, WS has determined that WS waterfowl damage management program activities in Georgia will have no cumulative adverse affects on the populations of migratory Canada geese in Georgia or the Atlantic Flyway.

Migratory Lesser Snow geese

Cumulative impacts of the proposed action on migratory lesser snow geese are based upon the anticipated WS take, hunter harvest, and authorized take by other (non-WS) entities. Since 1998, WS has lethally taken no snow geese in Georgia. Based upon past requests for WS assistance and an anticipated increase in future requests for services, WS anticipates that no more than 100 lesser snow geese would be killed by WS annually under the proposed action. During the 2003 snow goose hunting season a liberal daily bag limit of 5 geese (10 in possession) was in effect for the state of Georgia. No hunter harvest information was available in regards to the total number of snow geese harvested by Georgia waterfowl hunters. For Calendar Year 2003 (January 1 through December 31 2003), no snow geese were taken under depredation permits in Georgia by WS or non-WS entities.

Using the 2003 hunting season information, USFWS permitted take, WS anticipated kill of no more than 100 snow geese per year, and population trend data (see Section 1.3.2), the magnitude of WS impacts on the migratory lesser snow goose populations is considered to be very low.

While local populations of snow geese deemed above the WAC by the landowner or local community may be reduced, applicable state and federal laws and regulations authorizing take of snow geese, including the USFWS and the GADNR permitting processes, under which management actions would be implemented would ensure that the statewide and flyway population would not be reduced below state and Atlantic Flyway population goals and objectives. Therefore, WS has determined that WS waterfowl damage management program activities in Georgia will have no cumulative adverse affects on the populations of migratory lesser snow geese in Georgia or the Atlantic Flyway.

Mallard Ducks

Cumulative impacts of the proposed action on mallard ducks are based upon the anticipated WS take, hunter harvest, and authorized take by other (non-WS) entities. Since 1998, no mallard ducks have been lethally removed by WS in Georgia (Table 11). Based upon past requests for WS assistance and an anticipated increase in future requests for services, WS anticipates that no more than 100 mallard ducks would be killed by WS annually under the proposed action. During the 2003 duck hunting season the estimated harvest for Georgia was 15,013 mallard ducks (GADNR 2003). For Calendar Year 2003 (January 1 through December 31 2003), no mallard ducks were taken under depredation permits by entities other than WS.

Using the 2003 hunter harvest, USFWS permitted take, WS anticipated lethal take of no more than 100 mallard ducks per year, and population trend data (see Section 1.3.2), the magnitude of WS impacts on the mallard duck population is considered to be very low.

While local populations of mallard ducks deemed above the WAC by the local governing body may be reduced, applicable state and federal laws and regulations authorizing take of mallard ducks, including the USFWS and the GADNR permitting processes would ensure that the statewide and flyway populations would not be reduced below state and Atlantic Flyway population goals and objectives. Therefore, WS has determined that WS waterfowl damage management program activities in Georgia will have no cumulative adverse affects on the populations of mallard ducks in Georgia or the Atlantic Flyway.

Domestic and Feral Waterfowl

Based upon past requests for WS assistance and an anticipated increase in future requests for services, WS anticipates that the number of domestic and feral ducks killed by WS could increase substantially above the current level of take. Since 1998, WS has lethally removed a total of 279 domestic or feral waterfowl (Table 11). However even if WS lethal take increases 10 times above the current level, domestic and feral waterfowl are non-indigenous species considered by many wildlife biologists and ornithologists to be an undesirable component of North American wild and native ecosystems. Any reduction, even to the extent of complete eradication from the natural environment, could be considered a beneficial impact to native waterfowl species. Domestic and feral waterfowl are considered invasive nuisance birds to the natural environment and are not protected by Georgia state law or by federal law.

Mute Swans

Cumulative impacts of the proposed action on mute swan populations are based upon the anticipated WS take and take by other (non-WS) entities. Since 1998, WS has lethally taken no mute swans in Georgia. Based upon past requests for WS assistance and an anticipated increase in future requests for services, WS anticipates that no more than 100 mute swans would be killed by WS annually under the proposed action. For Calendar Year 2003 (January 1 through December 31 2003), no mute swans were taken under depredation permits in Georgia by WS or non-WS entities (In CY 2003, a USFWS depredation permit was required to lethally remove swans in Georgia. A USFWS migratory bird permit is no longer required under the Migratory Bird Treaty Reform Act of 2004).

Using USFWS permitted take, WS anticipated lethal take of no more than 100 mute swans per year and population trend data (see Section 1.3.2), the magnitude of WS impacts on the mute swan population is considered to be very low.

Mute swans are non-indigenous species considered by many wildlife biologists and ornithologists to be an undesirable component of North American wild and native ecosystems. Biologically, the optimum mute swan population size for Georgia is zero. The only management strategy currently identified in Georgia is to limit mute swans to private ponds only, and prevent their establishment on public waters (Atlantic Flyway Council 2003). Therefore, on state, federal, and other public lands the goal is zero mute swans. Therefore, WS has determined that WS waterfowl damage management program activities in Georgia will have no cumulative adverse affects on the populations of mute swans in Georgia or the Atlantic Flyway.

4.1.1.2 Alternative 2: Technical Assistance Only

Under this alternative, WS would have no impact on target waterfowl populations in Georgia because the WS program would not conduct any waterfowl population management activities and would provide advice only. Private efforts to reduce or prevent waterfowl damage and conflicts could increase, which could result in similar or even greater effects on those populations than the current program alternative. For the same reasons shown in the population effects analysis in Section 4.1.1.1, it is unlikely that target waterfowl populations would be adversely impacted by implementation of this alternative. It is hypothetically possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal use of chemicals which could lead to real but unknown effects on waterfowl populations (USDA 1997, White et al. 1989, USFWS 2001(b), USFDA 2003). Effects and hypothetical risks of illegal killing of waterfowl under this alternative would probably be about the same as those under Alternative 3.

4.1.1.3 Alternative 3: Non-Lethal Only By WS

Under this alternative, WS would not kill any target species because no lethal methods would be used. Although WS lethal take of waterfowl would not occur, it is likely that, without WS conducting some level of lethal waterfowl damage management activities for these species, private waterfowl damage management efforts would increase, leading to potentially similar or even greater effects on target species populations than those of the current program alternative. For the same reasons shown in the population effects analysis in section 4.1.1.1, it is unlikely that target waterfowl populations would be adversely impacted by implementation of this alternative. It is hypothetically possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal use of other chemicals which could lead to real but unknown effects on target waterfowl populations (USDA 1997, White et al. 1989, USFWS 2001(b), USFDA 2003). Effects and hypothetical risks of illegal killing of waterfowl under this alternative would probably be less than Alternative 4.

4.1.1.4 Alternative 4: No Federal WS Waterfowl Damage Management

Under this alternative, WS would have no impact on waterfowl populations in Georgia. Private efforts to reduce or prevent damage and conflicts could increase, which could result in effects on target species populations to an unknown degree. Effects on target species under this alternative could be the same, less, or more than those of the proposed action depending on the level of effort expended by private persons. For the same reasons shown in the population effects analysis in Section 4.1.1.1 it is unlikely that target waterfowl populations would be adversely impacted by implementation of this alternative. It is hypothetically possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal killing of waterfowl and therefore could lead to real but unknown effects on target waterfowl populations (USDA 1997, White et al. 1989, USFWS 2001(b), USFDA 2003).

4.1.2 Effectiveness of Waterfowl Damage Management Methods

4.1.2.1 Alternative 1: Integrated Wildlife Damage Management Program (Proposed Action/No Action)

This alternative would be more effective than any of the other alternatives in reducing or minimizing damage caused by waterfowl. Population limiting techniques (e.g., hunting, capture and euthanize, shooting, and nest/egg destruction) may have long-term effects and can slow population growth or even reduce the size of a waterfowl population (Cooper and Keefe 1997). This alternative would give WS the option to implement lethal management in response to human health and safety concerns and damage to property and other resources. This alternative would enhance WS effectiveness and ability to address a broader range of damage problems. Repopulation of sites where lethal management methods were used would undoubtedly take place as long as suitable habitat exists in that area. However, the use of lethal management would reduce the number of damaging waterfowl thereby enhancing the effectiveness of non-lethal methods (Smith et al. 1999). Kilpatrick and Walter (1999) reported that when an urban wildlife population above the WAC is reduced through lethal means, many residents subsequently experience reduced damage.

This alternative would likely reduce the potential for bird-aircraft collisions at airports and increase human safety. This has been demonstrated by Cooper (1991) who reported the removal of geese posing or likely to pose a hazard to air safety at airports considerably reduced the population of local geese, decreased the number of goose flights through airport operations airspace, and significantly reduced goose-aircraft collisions at Minneapolis-St. Paul International Airport. In addition, Dolbeer et al. (1993) demonstrated that an integrated approach (including removal of offending birds) reduced bird hazards at airports and substantially reduced bird collisions with aircraft by as much as 89%. Jensen (1996) also reported that an IWDM approach that incorporated removal of geese, reduced goose-aircraft collisions by 80% during a 2 year period.

This alternative would be more effective than Alternatives 2 or 3, which rely primarily on frightening or displacing waterfowl from one location to another.

4.1.2.2 Alternative 2: Technical Assistance Only

With WS technical assistance but no direct management, entities requesting waterfowl damage management would either take no action, which means conflicts and damage would likely continue or increase in each situation as bird numbers are maintained or increased, or implement WS recommendations for non-lethal and lethal control methods. Methods of frightening or discouraging waterfowl have been effective at specific sites. In most instances however, these methods have simply shifted the problem elsewhere (Conover 1984, Aguilera et al. (1991), and Swift 1998). Of the non-lethal techniques commonly used by the public to reduce conflicts with waterfowl (e.g., feeding ban, habitat modification, live swan, Methyl Anthranilate, fencing, harassment with dogs, people or vehicles), only fencing was reported to have been highly effective (Cooper and Keefe 1997). Habitat modifications, while potentially effective, are poorly accepted, not widely employed, and many include reducing water levels in wetlands and are not biologically sound. Long-term solutions usually require some form of local population reduction to stabilize or reduce waterfowl population size (Smith et al. 1999). Waterfowl population reduction would be limited to applicable state and federal laws and regulations authorizing take of waterfowl, including legal hunting and take pursuant to depredation permits. However, individuals or entities that implement lethal management may not have the experience necessary to efficiently and effectively conduct the actions.

4.1.2.3 Alternative 3: Non-Lethal Only By WS

Under this alternative, WS would be restricted to implementing and recommending only non-lethal methods in providing assistance with waterfowl damage problems. The success or failure of the use of non-lethal methods can be quite variable. Methods of frightening or discouraging waterfowl have been effective at specific sites. In most instances however, these methods have simply shifted the problem elsewhere (Conover 1984, Aguilera et al. 1991, and Swift 1998). However, if WS is providing direct operational assistance in dispersing waterfowl, coordination

with local authorities, who may assist in monitoring the birds' movements, is generally conducted to assure they do not reestablish in other undesirable locations. Of the non-lethal techniques commonly used by the public to reduce conflicts with waterfowl (e.g., feeding ban, habitat modification, live swan, Methyl Anthranilate, fencing, harassment with dogs, people or vehicles), only fencing was reported to have been highly effective (Cooper and Keefe 1997). Habitat modifications, while potentially effective, are poorly accepted, not widely employed, and many include reducing water levels in wetlands and are not biologically sound. Long-term solutions usually require some form of local population reduction to stabilize or reduce waterfowl population size (Smith et al. 1999). Overall impacts would be similar to Alternative 2.

4.1.2.4 Alternative 4: No Federal WS Waterfowl Damage Management.

With no WS assistance, private individuals and community government officials would either take no action, which means the waterfowl damage and conflicts would likely continue or increase in each situation as waterfowl numbers are maintained or increased, or individuals will implement their own non-lethal and lethal control methods. Impacts would be variable and dependent upon the actions taken by non-WS personnel.

4.1.3 Effects on Aesthetic Values

Effects on Human Affectionate-Bonds with Individual Birds and On Aesthetics

4.1.3.1 Alternative 1: Integrated Wildlife Damage Management Program (Proposed Action/No Action)

Some people who routinely view or feed individual geese, ducks, swans or domestic waterfowl would likely be disturbed by removal of such birds under the proposed program. People who have developed affectionate bonds with individual birds may feel sadness and anger if those particular birds were removed. WS is aware of such concerns and takes this into consideration to mitigate these affects. WS might sometimes be able to mitigate such concerns by leaving certain birds which might be identified by interested individuals.

Some people have expressed opposition to the killing of any waterfowl during waterfowl damage management activities. Under the current program, some lethal control of birds would continue and these persons would continue to be opposed. However, many persons who voice opposition have no direct connection or opportunity to view or enjoy the particular birds that would be killed by WS's lethal control activities. Lethal control actions would generally be restricted to local sites and to small percentages of overall waterfowl populations. Therefore, the species subjected to limited lethal control actions would remain common and abundant and would therefore continue to remain available for viewing by persons with that interest.

Lethal removal of waterfowl from airports should not affect the public's enjoyment of the aesthetics of the environment since airport properties are closed to the public. The ability to view and interact with waterfowl at these sites is usually either restricted to viewing from a location outside boundary fences, or is forbidden.

4.1.3.2 Alternative 2: Technical Assistance Only

Under this alternative, WS would not conduct any direct management, would still provide technical assistance or self-help advice to persons requesting assistance with waterfowl damage. WS would also not conduct any harassment of waterfowl that were causing damage. Some people who oppose direct management assistance in wildlife damage management by the government but favor government technical assistance would favor this alternative. Persons who have developed affectionate bonds with individual birds would not be affected by WS's activities under this alternative because the individual birds would not be killed by WS. However, other private

entities would likely conduct direct management assistance activities similar to those that would no longer be conducted by WS, and the effects would then be similar to the proposed action alternative.

4.1.3.3 Alternative 3: Non-Lethal Only By WS

Under this alternative, WS would not conduct any lethal wildlife damage management but would still conduct harassment and relocation of waterfowl that were causing damage. Some people who oppose lethal control of wildlife by the government but are tolerant of government involvement in non-lethal wildlife damage management would favor this alternative. Persons who have developed affectionate bonds with individual birds would not be affected by the death of individual birds under this alternative, but might oppose dispersal or translocation of certain birds. As discussed in this Subsection under Alternative 1, WS might sometimes be able to mitigate such concerns by leaving certain waterfowl which might be identified by interested individuals. In addition, the abundant populations of target waterfowl species in urban-suburban environments would enable people to continue to view them and to establish affectionate bonds with individual birds. Although WS would not perform any lethal activities under this alternative, other private entities would likely conduct waterfowl damage management activities similar to those that would no longer be conducted by WS, and the effects would then be similar to the proposed action alternative.

4.1.3.4 Alternative 4: No Federal WS Waterfowl Damage Management.

Under this alternative, WS would not conduct any lethal removal of waterfowl nor would the program conduct any harassment or relocation of birds. Some people who oppose any government involvement in wildlife damage management would favor this alternative. Persons who have developed affectionate bonds with individual birds would not be affected by WS's activities under this alternative. However, other private entities would likely conduct waterfowl damage management activities similar to those that would no longer be conducted by WS, and the effects would then be similar to the proposed action alternative.

Effects On Aesthetic Values of Property Damaged by Waterfowl

4.1.3.1 Alternative 1: Integrated Wildlife Damage Management Program (Proposed Action/No Action)

Under this alternative, operational assistance in reducing waterfowl conflicts, in which feces from the birds accumulate, would improve aesthetic values of affected properties. In addition, individuals whose aesthetic enjoyment of other birds and the environment is diminished by the presence of waterfowl and waterfowl feces will be positively affected by programs which result in reductions in the presence of waterfowl.

The dispersal of waterfowl by harassment and barriers can sometimes result in the birds causing the same or similar problems at the new location. If WS is providing direct operational assistance in dispersing such birds, coordination with local authorities, who may assist in monitoring the birds' movements, may be conducted to assure they do not reestablish in other undesirable locations.

4.1.3.2 Alternative 2: Technical Assistance Only

Under this alternative, the lack of operational assistance in reducing waterfowl problems could result in an increase of potential adverse affects on aesthetic values. However, potential adverse affects would likely be less than those for Alternative 4, since WS would be providing technical assistance.

The dispersal of waterfowl by harassment and barriers can sometimes result in the birds causing the same or similar problems at the new location. If WS has only provided technical assistance to local residents or municipal

authorities, coordination with local authorities to monitor the birds' movements to determine if birds become established in other undesirable locations may not be conducted, therefore increasing the potential of adverse effects to nearby property owners.

4.1.3.3 Alternative 3: Non-Lethal Only By WS

Under this alternative, WS would be restricted to non-lethal methods only. Assuming property owners would choose to allow and pay for the implementation of these non-lethal methods, this alternative could result in waterfowl relocating to other sites where they would likely create or worsen similar problems for other property owners. Thus, this alternative would likely result in more property owners experiencing adverse effects on the aesthetic values of their properties than the proposed action alternative.

The dispersal of waterfowl by harassment and barriers can sometimes result in the birds causing the same or similar problems at the new location. If WS is providing direct operational assistance in dispersing such birds, coordination with local authorities, who may assist in monitoring the birds' movements, may be conducted to determine if they become established in other undesirable locations.

4.1.3.4 Alternative 4: No Federal WS Waterfowl Damage Management

Under this alternative, the lack of any operational or technical assistance in reducing waterfowl problems would mean aesthetic values of some affected properties would continue to be adversely affected if the property owners were not able to reduce waterfowl damage in some other way. In many cases, this type of aesthetic "damage" would worsen because property owners would not be able to resolve their problems and waterfowl numbers would continue to increase.

The dispersal of waterfowl by harassment and barriers can sometimes result in the birds causing the same or similar problems at the new location. Coordination with local authorities to monitor waterfowl movements, to determine if birds become established in other undesirable locations, might not be conducted, therefore increasing the potential of adverse effects to nearby property owners.

4.1.4 Humaneness and Animal Welfare Concerns of Methods Used by WS

4.1.4.1 Alternative 1: Integrated Wildlife Damage Management Program (Proposed Action/No Action)

Under this alternative, methods viewed by some persons as inhumane would be used by WS. These methods would include capture and euthanasia, capture and relocate, capture and processing for human consumption, immobilization with the use of AC, egg treatments, and shooting.

There would likely be concern among stakeholders, in situations where waterfowl are captured and euthanized or captured and processed for human consumption, that the birds should be killed quickly. Many stakeholders would want waterfowl captured in a way that results in no pain or a minimization of pain, which they could measure as physical injury (e.g., bleeding, broken wing). Captured birds would be made as comfortable as possible by watering the birds as necessary, not overcrowding the birds if they are put in holding crates for transportation, and seeking shade for caged birds as necessary. There would likely also be concern among stakeholders, in situations where waterfowl are captured and processed for human consumption, that the birds should be killed quickly. Birds would be processed for human consumption in state licensed poultry processing facilities in accordance with all pertinent regulations.

There may be concern among stakeholders that birds sedated with alpha-chloralose should not be allowed to drown, even if the birds are to be euthanized. In situations where geese are being captured alive by use of alpha-chloralose, nets, or by hand, the birds would be euthanized by methods approved by the AVMA (Beaver et al. 2001). Most people would view AVMA approved methods of euthanizing animals as humane.

If waterfowl are shot, stakeholders would likely want quick clean kills of shot birds. Some persons would view shooting as inhumane. Some people could also be concerned about eggs being oiled, punctured, chilled, or addled. A minority of stakeholders would likely want no waterfowl captured, harassed, or killed because they consider putting birds in crates as inhumane, and the killing of birds as inhumane regardless of the method used.

Some people have concerns over the potential for separation of waterfowl family groups through management actions. This could occur through harassment (e.g., pyrotechnics, dogs) and lethal control methods. However, it is not uncommon for waterfowl family units to experience change. Bellrose (1980) cites several sources which list annual mortality rates of juvenile waterfowl ranging from 7 to 19% during the hatching to fledgling stage. Biologists believe that juvenile birds have a good likelihood of survival without adult birds once the juvenile reaches fledgling stage, which occurs by July for most juvenile birds. Therefore, molting juvenile waterfowl that escape capture would most likely survive to adulthood (Mississippi Flyway Council Technical Section 1996). Separated adults form new pair bonds and readily breed with new mates (Moser et al. 1991).

4.1.4.2 Alternative 2: Technical Assistance Only

Under this alternative, WS would not conduct any lethal or non-lethal management actions, and would provide self-help advice only. Thus, methods viewed as inhumane by some persons would not be used by WS. However, without WS direct management assistance, it is expected that many people experiencing waterfowl damage would implement their own damage management program. Overall, impacts on humaneness and animal welfare concerns associated with waterfowl damage management under this alternative would likely be similar to the proposed action alternative.

4.1.4.3 Alternative 3: Non-Lethal Only By WS

Under this alternative, lethal methods viewed as inhumane by some persons would not be used by WS. However, it is expected that many requesters of waterfowl damage management assistance would likely implement lethal methods that would not be available from WS. Overall, waterfowl damage management under this alternative would likely be similar to the proposed action alternative.

4.1.4.4 Alternative 4: No Federal WS Waterfowl Damage Management

Under this alternative, methods viewed as inhumane by some persons would not be used by WS. However, these methods could be used by non-WS entities and, similar to the proposed action alternative, would be viewed by some persons as inhumane. Overall, waterfowl damage management under this alternative would likely be similar to the proposed action alternative.

4.1.5 Effects on Non-target Wildlife Species Populations, Including T&E Species

4.1.5.1 Alternative 1: Integrated Wildlife Damage Management Program (Proposed Action/No Action)

WS, other wildlife professionals, and the public are concerned with the impact of damage management methods and activities on non-target species, especially threatened and endangered (T&E) species. WS's standard operating procedures include measures intended to mitigate or reduce the effects on non-target species populations and are

presented in Chapter 3. WS has not killed any non-target wildlife species while conducting waterfowl damage management activities in Georgia and does not anticipate this number to substantially increase. While every precaution is taken to safeguard against taking non-target birds, changes in local flight patterns and other unanticipated events can result in the incidental take of unintended species. These occurrences are rare and should not affect the overall populations of any species under the current program.

Direct impacts on nontarget species occur when WS program personnel inadvertently kill, injure, or harass animals that are not target species. In general, these impacts result from the use of methods that are not completely selective for target species. Nontarget migratory bird species and other wildlife species are usually not affected by WS's management methods, except for the occasional scaring from harassment devices. In these cases, migratory birds and other affected wildlife may temporarily leave the immediate vicinity of scaring, but would most likely return after conclusion of the action.

WS personnel are experienced and trained in wildlife identification, and to select the most appropriate methods for taking targeted animals and excluding nontarget species. Shooting is virtually 100% selective for the target species; therefore no adverse impacts are anticipated from use of this method. Any non-target species captured in a live trap would be released unharmed on site. Nonlethal chemical products that might be used or recommended by WS would include repellents such as methyl or di-methyl anthranilate (artificial grape flavoring used in foods and soft drinks sold for human consumption), which has been used as an area repellent, anthraquinone, and the tranquilizer drug alpha-chloralose. Such chemicals have undergone rigorous testing and research to prove safety, effectiveness, and low environmental risks before they would be registered by EPA or FDA. Any operational use of chemical repellents would be in accordance with labeling requirements under FIFRA and State pesticide laws and regulations which are established to avoid unreasonable adverse effects on the environment. Following labeling requirements and use restrictions are a built-in mitigation measure that would assure that use of registered chemical products would avoid significant adverse effects on wildlife populations. Based on a thorough Risk Assessment, APHIS concluded that, when chemical methods are used by WS in accordance with label directions, they are highly selective to target individuals or populations, and such use has negligible effects on the environment (USDA 1997).

T&E Species Effects. Special efforts are made to avoid jeopardizing T&E species through biological evaluations of the potential effects and the establishment of special restrictions or mitigation measures. WS has obtained the list of federally listed T&E species for the state of Georgia (see Appendix C). WS has consulted with the USFWS under Section 7 of the ESA concerning potential impacts of waterfowl damage management methods on T&E species and has obtained a Biological Opinion. For the full context of the Biological Opinion, see Appendix F of the ADC Final EIS (USDA 1997, Appendix F).

WS waterfowl damage management activities in Georgia would not adversely affect the American alligator, gray bat, Indiana bat, amber darter, snail darter, bald eagle, piping plover, green sea turtle, hawksbill sea turtle, Kemp's ridely sea turtle, leatherback sea turtle, loggerhead sea turtle, eastern indigo snake, wood stork, shortnose sturgeon, roseate tern, hairy rattleweed, pondberry, Canby's dropwort, or green pitcher-plant. This determination is based on the conclusions made by the USFWS during their 1992 programmatic consultation of WS activities and subsequent Biological Opinion (USDA 1997, Appendix F). The USFWS determined that the management activities being utilized for WS waterfowl damage management activities are not likely to adversely affect these listed species. In addition, WS has determined that the use of waterfowl damage management methods will have no effect on those T&E species not included in the 1992 BO or their critical habitats. Furthermore, WS has determined that the use Alpha-chloralose and lasers will have no effect on any listed T&E species. Therefore, WS has determined that the proposed WS waterfowl damage management program will not likely adversely affect any federally listed T&E species. The USFWS concurs with WS determination (S. Tucker, USFWS; Dec. 11, 2003).

WS has obtained and reviewed the list of Georgia State listed T&E species and has determined that the proposed WS waterfowl damage management program will not adversely affect any of the species listed in Georgia.

4.1.5.2 Alternative 2: Technical Assistance Only

Alternative 2 would not allow any WS direct operational waterfowl damage management in Georgia. There would be no impact on non-target or T&E species by WS activities from this alternative. Technical assistance or self-help information would be provided upon request. Although technical support might lead to more selective use of control methods by private individuals than that which might occur under Alternative 4, private efforts to reduce or prevent depredations could still result in less experienced persons implementing control methods leading to greater take of non-target wildlife than under the Proposed Action. It is possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal killing of waterfowl, which could lead to unknown effects on local non-target species populations, including some T&E species (USDA 1997, White et al. 1989, USFWS 2001(b), USFDA 2003). Hazards to raptors, including bald eagles and falcons, could therefore be greater under this alternative if chemicals that are less selective or that cause secondary poisoning are used by frustrated private individuals.

4.1.5.3 Alternative 3: Non-Lethal Only By WS

Under this alternative, WS take of non-target animals would hypothetically be less than that of the proposed action because no lethal control actions would be taken by WS. However, non-target take would not differ substantially from the proposed/current program because the current program has taken no non-target animals. On the other hand, people whose waterfowl damage problems were not effectively resolved by non-lethal control methods would likely resort to other means of lethal control such as use of shooting by private persons or even illegal use of chemical toxicants. This could result in less experienced persons implementing control methods and could lead to greater take of non-target wildlife than the proposed action. For example, shooting by persons not proficient at bird identification could lead to killing of non-target birds. It is hypothetically possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal killing of waterfowl which could lead to unknown effects on local non-target species populations, including T&E species (USDA 1997, White et al. 1989, USFWS 2001(b), USFDA 2003). Hazards to raptors, including bald eagles and falcons, could therefore be greater under this alternative if chemicals that are less selective or that cause secondary poisoning are used by frustrated private individuals. Potential impacts of WS use of non-lethal methods would be similar to the proposed action.

4.1.5.4 Alternative 4: No Federal WS Waterfowl Damage Management

Alternative 4 would not allow any WS waterfowl damage management in Georgia. There would be no impact on non-target or T&E species by WS activities from this alternative. However, private efforts to reduce or prevent depredations could increase, which could result in less experienced persons implementing control methods and could lead to greater take of non-target wildlife than under the proposed action. It is hypothetically possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal killing of waterfowl which could impact local non-target species populations, including some T&E species (USDA 1997, White et al. 1989, USFWS 2001(b), USFDA 2003). Hazards to raptors, including bald eagles and peregrines, could therefore be greater under this alternative if chemicals that are less selective or that cause secondary poisoning are used by frustrated private individuals.

4.2 CUMULATIVE IMPACTS

Cumulative impacts, as defined by CEQ (40 CFR 1508.7), are impacts to the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts may result from individually minor, but collectively significant, actions taking place over time.

Under Alternatives 1, 2 and 3, WS would address damage associated with waterfowl in a number of situations throughout the State. The WS program would be the primary federal program with waterfowl damage management responsibilities; however, some state and local government agencies may conduct damage management activities in

Georgia as well. Through ongoing coordination with these agencies, WS is aware of such activities and may provide technical assistance in such efforts. WS does not normally conduct direct damage management activities concurrently with such agencies in the same area, but may conduct waterfowl damage management activities at adjacent sites within the same time frame. In addition, commercial pest control companies may conduct waterfowl damage management activities in the same area. The potential cumulative impacts analyzed below could occur either as a result of WS waterfowl damage management program activities over time, or as a result of the aggregate effects of those activities combined with the activities of other agencies and individuals.

Cumulative Impacts on Wildlife Populations

Waterfowl Damage Management methods used or recommended by the WS program in Georgia will likely have no cumulative adverse effects on target and non-target wildlife populations. WS limited lethal take of target waterfowl species is anticipated to have minimal impacts on target waterfowl populations in Georgia, the region, and the U.S. When control actions are implemented by WS the potential lethal take of non-target wildlife species is expected to be minimal to non-existent.

Cumulative Impact Potential from Chemical Components

Non-lethal chemicals may be used or recommended by the WS program in Georgia. Characteristics of these chemicals and use patterns indicate that no significant cumulative impacts related to environmental fate are expected from their use in WS waterfowl damage management programs in Georgia.

Cumulative Impact Potential from Non-chemical Components

Non-chemical methods used or recommended by the WS program may include exclusion through use of various barriers, habitat modification of structures or vegetation, live trapping and translocation or euthanasia of birds, nest and egg destruction, harassment of birds or bird flocks, and shooting. When control actions are implemented by WS the potential adverse effects of these control methods are expected to be minimal to non-existent.

SUMMARY

No significant cumulative environmental impacts are expected from any of the 4 alternatives. Under the Proposed Action, the lethal removal of waterfowl by WS would not have a significant impact on overall target waterfowl populations in Georgia, but some local reductions may occur. No risk to public safety is expected when WS's services are provided and accepted by requesting individuals in Alternatives 1, 2, and 3, since only trained and experienced wildlife biologists/specialists would conduct and recommend damage management activities. There is a slight increased risk to public safety when persons who reject WS assistance and recommendations in Alternatives 1, 2 and 3 and conduct their own activities, and when no WS assistance is provided in Alternative 4. In all 4 Alternatives, however, it would not be to the point that the impacts would be significant. Although some persons will likely be opposed to WS's participation in waterfowl damage management activities on public and private lands within the state of Georgia, the analysis in this EA indicates that WS Integrated Waterfowl Damage Management program will not result in significant cumulative adverse impacts on the quality of the human environment. Table 12 summarizes the expected impact of each of the alternatives on each of the issues.

Table 4-1. Summary of the expected impacts of each of the alternatives on each of the issues related to waterfowl damage management by WS in Georgia.

Issues	*Alternative 1 Integrated Wildlife Damage Management Program (Proposed Action/No Action)*	*Alternative 2 Technical Assistance Only*	*Alternative 3 Nonlethal Waterfowl Damage Management Only by WS*	*Alternative 4 No Federal WS Waterfowl Damage Management*
Effects on Target Waterfowl Populations	Low effect - reductions in local waterfowl numbers; would not adversely affect state and flyway populations.	Low effect – No effect by WS; reductions in local waterfowl numbers by non-WS personnel likely; would not adversely affect state and flyway populations.	Low effect – No effect by WS; reductions in local waterfowl numbers by non-WS personnel likely; would not adversely affect state and flyway populations.	Low effect – No effect by WS; reductions in local waterfowl numbers by non-WS personnel likely; would not adversely affect state and flyway populations.
Effectiveness of Wildlife Damage Management Methods	The proposed action has the greatest potential of successfully reducing waterfowl conflicts and damage	Impacts could be similar or less than the proposed action dependent upon action taken by non-WS personnel.	Impacts could be similar or less than the proposed action dependent upon action taken by non-WS personnel.	Impacts could be similar or less than the proposed action dependent upon action taken by non-WS personnel.
Effects on Human Affectionate-Bonds With Individual Birds and On Aesthetics	Low to moderate effect at local levels; Some local populations may be reduced; WS waterfowl damage management activities do not adversely affect overall regional or state waterfowl populations.	Low to moderate effect. No effect by WS; local waterfowl numbers in damage situations would remain high or possibly increase unless non-WS personnel successfully implement lethal methods; no adverse affect on overall regional and state waterfowl populations.	Low to moderate effect. Local waterfowl numbers in damage situations would remain high or possibly increase when non-lethal methods are ineffective unless non-WS personnel successfully implement lethal methods; no adverse affect on overall regional and state waterfowl populations.	Low to moderate effect. No effect by WS; local waterfowl numbers in damage situations would remain high or possibly increase unless non-WS personnel successfully implement lethal methods; no adverse affect on overall regional and state waterfowl populations.

Effects On Aesthetic Values of Property Damaged by Waterfowl	Low effect – Waterfowl damage problems most likely to be resolved without creating or moving problems elsewhere.	Moderate to High effect – No effect by WS; Waterfowl may move to other sites which can create aesthetic damage problems at new sites.	Moderate to High effect – Waterfowl may move to other sites which can create aesthetic damage problems at new sites. Less likely than Alt. 2 and 4.	High – No effect by WS; nuisance waterfowl problems less likely to be resolved without WS involvement. Waterfowl may move to other sites which can create aesthetic damage problems at new sites
Humaneness and Animal Welfare Concerns of Methods Used by WS	Low to moderate effect - methods viewed by some people as inhumane would be used by WS	No effect by WS. Impacts by non-WS personnel would be variable.	Lower effect than Alt. 1 since only non-lethal methods would be used by WS	No effect by WS. Impacts by non-WS personnel would be variable.
Effects on Nontarget Wildlife Species Populations, Including T&E Species	Low effect - methods used by WS would be highly selective with very little risk to nontarget species.	No effect by WS. Impacts by non-WS personnel would be variable.	Low effect - methods used by WS would be highly selective with very little risk to nontarget species.	No effect by WS. Impacts by non-WS personnel would be variable.

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APPENDIX A

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APPENDIX B

Waterfowl Damage Management Methods Available for Use or Recommended by the Georgia Wildlife Services Program

The most effective approach to resolving wildlife damage problems is to integrate the use of several methods, either simultaneously or sequentially. Integrated Wildlife Damage Management (IWDM) would integrate and apply practical methods of prevention and reduce damage by wildlife while minimizing harmful effects of damage reduction measures on humans, other species, and the environment. IWDM may incorporate resource management, physical exclusion and deterrents, and population management, or any combination of these, depending on the characteristics of specific damage problems.

In selecting damage management techniques for specific damage situations, consideration is given to the responsible species and the magnitude, geographic extent, duration and frequency, and likelihood of wildlife damage. Consideration is also given to the status of target and potential non-target species, local environmental conditions and impacts, social and legal aspects, and relative costs of damage reduction options. The cost of damage reduction may sometimes be a secondary concern because of the overriding environmental, legal, and animal welfare considerations. These factors are evaluated in formulating damage management strategies that incorporate the application of one or more techniques.

A variety of methods are potentially available to the WS program in Georgia relative to the management or reduction of damage from waterfowl. Various federal, state, and local statutes and regulations and WS directives govern WS use of damage management tools and substances. WS develops and recommends or implements IWDM strategies based on resource management, physical exclusion and wildlife management approaches. Within each approach there may be available a number of specific methods or tactics. The following methods and materials are recommended or used in technical assistance and direct damage management efforts of the WS program in Georgia.

RESOURCE MANAGEMENT

Resource management includes a variety of practices that may be used by resource owners to reduce the potential for wildlife damage. Implementation of these practices is appropriate when the potential for damage can be reduced without significantly increasing a resource owner's costs or diminishing his/her ability to manage resources pursuant to goals. Resource management recommendations are made through WS technical assistance efforts.

Habitat Alteration: Habitat alteration can be the planting of vegetation unpalatable to wildlife or altering the physical habitat (Conover and Kania 1991, Conover 1992). Conover (1991[a], 1991[b]) found that even hungry Canada geese refused to eat some ground covers such as common periwinkle (*Vinca minor*), English ivy (*Hedera helix*) and Japanese pachysandra (*Pachysandra terminalis*). Planting less preferred plants or grasses to discourage geese from a specific area could work more effectively if good alternative feeding sites are nearby (Conover 1985). However, the manipulation of turf grass varieties in urban/suburban, heavy use situations such as parks, athletic fields and golf courses is often not feasible. Varieties of turf grass that grow well and can withstand regular mowing and regular/heavy human use include: Kentucky blue grass, red fescue, perennial bent grass, perennial rye grass and white clover. All of these grasses are appealing to most waterfowl. The turf grass varieties that are not appealing to some waterfowl such as, tall fescue, orchard grass and timothy, do not withstand regular mowing and/or regular/heavy human use.

Fences, hedges, shrubs, boulders, etc. can be placed at shorelines to impede waterfowl movements. Restricting a bird's ability to move between water and land will deter them from an area, especially during molts (Gosser et al. 1997). However, people are often reluctant to make appropriate landscape modifications to discourage waterfowl activity (Breault and McKelvey 1991, Conover and Kania 1991). Unfortunately, both humans and waterfowl appear

to find lawn areas near water attractive (Addison and Amernic 1983, Cooper[a] In Press), and conflicts between humans and waterfowl will likely continue wherever this interface occurs.

Removal of water bodies would likely reduce the attractiveness of an area to waterfowl. Urban/suburban waterfowl tend to feed near bodies of water with a distant view over short grass (Conover and Kania 1991). Draining/removal of water bodies are considered unreasonable and aesthetically unacceptable. The draining of wetlands is strictly regulated by the U.S. Army Corps of Engineers and the Department of Environmental Protection.

Lure Crops: Lure crops are food resources planted to attract wildlife away from more valuable resources (e.g., crops). This method is largely ineffective for urban waterfowl since food (turf) resources are readily available. For lure crops to be effective, the ability to keep birds from surrounding fields would be necessary, and the number of alternative feeding sites must be minimal (Fairaizl and Pfeifer 1988). Additionally, lure crops reduce damage for only a short time (Fairaizl and Pfeifer 1988) and damage by waterfowl is generally continuous. The resource owner is limited in implementing this method contingent upon ownership of, or otherwise ability to manage the property. Unless the original waterfowl-human conflict is resolved, creation of additional waterfowl habitat could increase future conflicts.

Lure crops may be planted on some land held in private ownership, such as conservation clubs, throughout Georgia. These plantings may provide some additional food or act as an attractant for waterfowl. However, it is highly unlikely they contribute to conflicts with waterfowl or act as significant waterfowl attractants.

Modify Human Behavior: Artificial feeding of waterfowl by people attracts and sustains more birds in an area than could be supported by natural food supplies. This unnatural food source exacerbates damage by waterfowl. The elimination of feeding of waterfowl is a primary recommendation made by WS, and many local municipalities and homeowners associations have adopted policies and ordinances prohibiting it. Some parks have posted signs, and there have been efforts made to educate the public on the negative aspects of feeding waterfowl. However, sometimes people do not comply, and the policies are poorly enforced in some areas.

Alternatively, some entities do not prohibit the feeding of waterfowl because the waterfowl population in the location has not exceeded the WAC. It is unlikely that the feeding of waterfowl in these locations would significantly contribute to conflicts with waterfowl in other communities or locations.

Alter Aircraft Flight Patterns: In cases where the presence of waterfowl at airports results in threats to human safety, and when such problems cannot be resolved by other means, the alteration of aircraft flight patterns or schedules may be recommended. However, altering operations at airports to decrease the potential for hazards is not feasible unless an emergency situation exists. Otherwise, the expense of interrupted flights and the limitations of existing facilities make this practice prohibitive.

Removal of Domestic Waterfowl: Flocks of urban waterfowl are known to act as decoys and attract migrating waterfowl (Crisley et al. 1968, Woronecki 1992, AAWV undated). Rabenold (1987) and Avery (1994) reported that birds learn to locate food resources by watching the behavior of other birds. The removal of domestic waterfowl from ponds removes birds that act as decoys in attracting other waterfowl. Domestic and feral waterfowl could also carry diseases which threaten wild populations. Property or resource owners may be reluctant to remove some or all decoy birds because of the enjoyment of their presence.

PHYSICAL EXCLUSION AND DETERRENTS

Physical exclusion and deterrents restrict the access of wildlife to resources and/or alter behavior of target animals to reduce damage. These methods provide a means of appropriate and effective prevention of waterfowl damage in many situations. When threatened and endangered species exist on a site, certain methods will not be incorporated

in management plans. Exclusions/scare devices will not be used in areas that are frequented by the wood stork, bald eagle, red cockaded woodpecker, etc.

Electric Fence: The application of electrified fencing is generally limited to rural settings, due to the possibility/likelihood of electricity interacting with people and pets. Limits of this application arise where there are multiple landowners along the wetland, pond, or lake, and the size of the field and its proximity to bodies of water used by waterfowl. Perceptions from Minnesota on the effectiveness of electric fences were high (Cooper and Keefe 1997). While electric fencing may be effective in repelling waterfowl in some urban settings, its use is often prohibited in many municipalities for human safety reasons. Problems that typically reduce the effectiveness of electric fences include; vegetation on fence, flight capable waterfowl, fencing knocked down by other animals (e.g., white-tailed deer and dogs), and poor power.

Barrier Fence: The construction or placement of physical barriers has limited application for waterfowl. Barriers can be temporary or permanent structures. Lawn furniture/ornaments, vehicles, boats, snow fencing, plastic hazard fencing, metal wire fencing, and multiple strand fencing have all been used to limit the movement of waterfowl. The application of this method is limited to areas that can be completely enclosed and do not allow waterfowl to land inside enclosures. Similar to most abatement techniques, this method has been most effective when dealing with small numbers of breeding waterfowl and their flightless young along wetlands and/or waterways. Unfortunately, there have been situations where barrier fencing designed to inhibit waterfowl nesting has entrapped young and resulted in starvation (Cooper 1998). The preference for waterfowl to walk or swim, rather than fly, during this time period contributes to the success of barrier fences. Waterfowl that are capable of full or partial flight render this method useless, except for enclosed areas small enough to prevent landing. However, site specific habitat alterations have merit, provided that landscape designs are based on biological diversity and human safety objectives (Cooper[b] In Press).

Surface Coverings: Waterfowl may be excluded from ponds using overhead wire grids (Fairaizl 1992, Lowney 1993). Overhead wire grids have been demonstrated to be most applicable on ponds $\leq$ two acres, but wire grids may be considered aesthetically unappealing to some people. Wire grids render a pond unusable for boating, swimming, fishing, and other recreational activities. Installation costs are about $1,000 per surface acre for materials. The expense of maintaining wire grids may be burdensome for some people.

Balls approximately five inches in diameter can be used to cover the surface of a pond. A "ball blanket" renders a pond unusable for boating, swimming, fishing, and other recreational activities. This method is very expensive, costing about $131,000 per surface acre of water.

Visual Deterrents: Reflective tape has been used successfully to repel some birds from crops when spaced at three to five meter intervals (Bruggers et al. 1986, Dolbeer et al. 1986). Mylar flagging has been reported effective at reducing migrant Canada goose damage to crops (Heinrich and Craven 1990). Flagging is impractical in many locations and has met with some local resistance due to the negative aesthetic appearance presented on the properties where it is used. Other studies have shown reflective tape ineffective (Tobin et al. 1988, Bruggers et al. 1986, Dolbeer et al. 1986, Conover and Dolbeer 1989). While sometimes effective for short periods of time, reflective tape has proven mostly ineffective in deterring resident geese.

Mute Swans: Mute swans are ineffective at preventing Canada geese from using or nesting on ponds (Conover and Kania 1994). Additionally, swans can be aggressive towards humans (Conover and Kania 1994, Chasko 1986) and may have undesirable effects on native aquatic vegetation (Allin et al. 1987, Chasko 1986). Executive Order 11987 May 24, 1977, states that federal agencies shall encourage states, local governments, and private citizens to prevent the introduction of exotic species into the environment. The use of mute swans as a Canada goose damage management technique is ineffective, and not recommended.

Dogs: Dogs can be effective at harassing waterfowl and keeping them off turf and beaches (Conover and Chasko 1985, Castelli and Sleggs 2000). Around water, this technique appears most effective when the body of water to be patrolled is less than two acres in size (Swift 1998). Although dogs can be effective in keeping waterfowl off individual properties, they do not contribute to a solution for the larger problem of overabundant waterfowl populations (Castelli and Sleggs 2000). Swift (1998) and numerous individuals in New Jersey have reported that when harassment with dogs ceases, the number of geese return to pre-treatment numbers. WS has recommended and encouraged the use of dogs where appropriate.

Repellents: To use chemical repellents for waterfowl damage management in Georgia, State regulations governing use of restricted chemicals must be followed.

Methyl Anthranilate (MA) (artificial grape flavoring used in foods and soft drinks for human consumption) could be used or recommended by WS as a waterfowl repellent. Methyl Anthranilate is a registered repellent for waterfowl and is marketed under the trade names ReJeX-iT and Bird Shield. The material has been shown to be nontoxic to bees (LD_{50} > 25 micrograms/bee[3]), nontoxic to rats in an inhalation study (LC_{50} > 2.8 mg/L[4]), and of relatively low toxicity to fish and other invertebrates. Methyl anthranilate is naturally occurring in concord grapes and in the blossoms of several species of flowers and is used as a food additive and perfume ingredient (Dolbeer et al. 1992; RJ Advantage, Inc. 1997). It has been listed as "Generally Recognized as Safe" by the FDA (Dolbeer et al. 1992).

Methyl anthranilate has been shown to be a promising repellent for many bird species (Dolbeer et al. 1993). It is registered for applications to turf or to surface water areas used by unwanted birds. Cummings et al. (1995) reported that MA repelled Canada geese from grazing turf for four days. However, Belant et al. (1996) found it ineffective as a grazing repellent when applied at 22.6 and 67.8 kg/ha which is the label rate and triple the label rate, respectively. MA is water soluble therefore, moderate to heavy rain or daily watering and/or mowing render MA ineffective. Testing in numerous locations throughout Wisconsin during the 1990s indicated that in many situations MA is cost prohibitive, is only marginally effective in repelling geese, and commonly just causes geese to move to nearby untreated areas. (P. Vagnini, West Bend Parks, Recr. and For. Dept., April, 2000, D. Keuler, Rock River Hills Golf Course, April, 2000, and G. Youngs, Milwaukee County Dept. Parks, Recr. and Culture, March, 2000, pers. comm.).

Water surface and turf applications of MA are generally considered expensive. For example, the least intensive application rate required by label directions is 20 lbs. of product (8 lbs. active ingredient) per acre of surface water at a cost of about $64/lb., with re-treatment required every 3-4 weeks (RJ Advantage, Inc. 1997). The cost of treating turf areas would be similar on a per acre basis. Also, MA completely degrades in about 3 days when applied to water (RJ Advantage, Inc. 1997), which indicates the repellent effect is short-lived.

Another potentially more cost-effective method of MA application is by use of a fog-producing machine (Vogt 1997). The fog drifts over the area to be treated and is irritating to the birds while being non-irritating to any humans that might be exposed. Fogging applications must generally be repeated 3-5 times after the initial treatment before the birds abandon a treatment site (Dr. P. Vogt, RJ Advantage, Inc., Pers. Comm. 1997). Applied at a rate of about .25 l./acre of water surface, the cost is considerably less than when using the turf or water treatment methods.

Other Repellents. Research continues on other avian feeding repellents. A 50% anthraquinone product (FlightControl), shows promise for waterfowl (Dolbeer et al. 1998). Like MA, anthraquinone has low toxicity to birds and mammals. Activated charcoal has also been evaluated for use in deterring waterfowl damage, but it requires frequent re-application to effectively reduce waterfowl damage (Mason and Clark 1995). Further,

[3] A n LD_{50} is the dosage in milligrams of material per kilogram of body weight, or, in this case in micrograms per individual bee, required to cause death in 50% of a test population of a species.
[4] A n LC_{50} is the dosage in milligrams of material per liter of air required to cause death in 50% of a test population of a species through inhalation.

laboratory and field trials are needed to refine minimum repellent levels and to enhance retention of treated vegetation (Sinnott 1998).

Hazing: Hazing reduces losses in those instances when the affected waterfowl move to a more acceptable area. Achieving that end has become more difficult as the local waterfowl population has increased. Birds hazed from one area where they are causing damage, frequently move to another area where they cause damage (Brough 1969, Conover 1984, Summers 1985, Swift 1998). Smith et al. (1999) noted that others have reported similar results, stating: "..biologists are finding that some techniques (e.g., habitat modifications or scare devices) that were effective for low to moderate population levels tend to fail as flock sizes increase and waterfowl become more accustomed to human activity . Generally speaking, birds tend to habituate to hazing techniques (Zucchi and Bergman 1975, Blokpoel 1976, Summers 1985, Aubin 1990). In some locations and circumstances, hazing waterfowl is a useful component of a waterfowl damage management program.

Scarecrows: The use of scarecrows has had mixed results. Effigies depicting alligators, humans, floating swans and dead geese have been employed, with limited success for short time periods in small areas. An integrated approach (swan and predator effigies, distress calls and non-lethal chemical repellents) was found to be ineffective at scaring or repelling nuisance waterfowl (Conover and Chasko 1985). While Heinrich and Craven (1990) reported that using scarecrows reduced migrant Canada goose use of agricultural fields in rural areas, their effectiveness in scaring geese from suburban/urban areas is severely limited because geese are not afraid of humans as a result of nearly constant contact with people. In general, scarecrows are most effective when they are moved frequently, alternated with other methods, and are well maintained. However, scarecrows tend to lose effectiveness over time and become less effective as waterfowl populations increase (Smith et al. 1999).

Distress Calls: Aguilera et al. (1991) found distress calls ineffective in causing migratory and resident geese to abandon a pond. Although, Mott and Timbrook (1988) reported distress calls as effective at repelling resident geese 100 meters from the distress unit, the birds would return shortly after the calls stopped. The repellency effect was enhanced when pyrotechnics were used with the distress calls. In some situations, the level of volume required for this method to be effective in urban/suburban areas would be prohibited by local noise ordinances. A similar device, which electronically generates sound, has proven ineffective at repelling migrant waterfowl (Heinrich and Craven 1990).

Lasers: The use of lasers as non-lethal avian damage control tools, have recently been evaluated for a number of species (Blackwell et al. 2002); research on this potential tool has been conducted in a replicated format only for double-crested cormorants (Glahn et al. 2000). The integrated use of lasers as part of waterfowl damage management programs by WS in Georgia may increase program effectiveness, and would be incorporated as appropriate. Wide scale public use of lasers is not typically recommended at this time, pending additional research (on effectiveness and impacts) on its use as a waterfowl damage management tool. In some situations (neighborhoods, schools, hospitals), use of lasers may enhance integrated control programs since they are silent and do not fire a projectile.

Pyrotechnics: Pyrotechnics (screamer shells, bird bombs, and 12-gauge cracker shells) have been used to repel many species of birds (Booth 1994). Aguilera et al. (1991) found 15mm screamer shells effective at reducing resident and migrant Canada geese use of areas of Colorado. However, Mott and Timbrook (1988) and Aguilera et al. (1991) doubted the efficacy of harassment and believed that moving the geese simply redistributed the problem to other locations.

Fairaizl (1992) and Conomy et al. (1998) found the effectiveness of pyrotechnics highly variable among different flocks of waterfowl. Some flocks in urban areas required continuous harassment throughout the day with frequent discharges of pyrotechnics. The waterfowl usually returned within hours. A minority of resident Canada goose flocks in Virginia showed no response to pyrotechnics (Fairaizl 1992). Some flocks of Canada geese in Virginia have shown quick response to pyrotechnics during winter months suggesting migrant geese made up some or all of

the flock (Fairaizl 1992). Shultz et al. (1988) reported fidelity of resident Canada geese to feeding and loafing areas is strong, even when heavy hunting pressure is ongoing. Mott and Timbrook (1988) concluded that the efficacy of harassment with pyrotechnics is partially dependent on availability of alternative loafing and feeding areas. Although one of the more effective methods of frightening waterfowl away, more often than not they simply move waterfowl to other areas. There are also safety and legal implications regarding their use. Discharge of pyrotechnics is inappropriate and prohibited in some urban/suburban areas. Pyrotechnic projectiles can start fires, ricochet off buildings, pose traffic hazards, and trigger dogs to bark incessantly, annoy and possibly injure people.

Use of pyrotechnics in certain municipalities would be constrained by local firearm discharge and noise ordinances.

Propane Cannons: Propane cannons are generally inappropriate for urban/suburban areas due to the repeated loud explosions, which many people would consider a serious and unacceptable nuisance and potential health threat (hearing damage). Although a propane cannon can be an effective dispersal tool for migrant waterfowl in agricultural settings, resident waterfowl in urban areas are more tolerant of noise and habituate to propane cannons relatively quickly.

POPULATION MANAGEMENT

Potential methods of managing the local waterfowl population include capture and relocation, contraception, egg destruction, hunting, shooting, and capture and euthanize. The advantages of lethal damage management by WS are that it would be applied directly to the problem population, its effects are obvious and immediate, and it carries no risk that the birds will return or move and create conflicts elsewhere. The primary disadvantage is that it is sometimes more socially controversial than other techniques. The use of lethal methods to reduce waterfowl damage can be very effective at alleviating damage and the most economical approach to reducing damage when compared to non-lethal methods (Cooper and Keefe 1997). Additionally, capture and removal of waterfowl is the most cost efficient lethal method to reduce damage, except for hunting (Cooper and Keefe 1997). Moreover, the use of lethal methods has longer effectiveness than non-lethal methods because it would likely take months to years before the original local population level of waterfowl returned. Lethal methods would also reduce conflicts among resource owners whereas non-lethal actions only move the waterfowl among resource owners (i.e., spread the damage) (Cooper and Keefe 1997, Smith et al. 1999), and possibly leave resource owners with the fewest financial means burdened with the waterfowl and the damage.

Capture and Relocation: Waterfowl are live captured through the use of non-chemical (panel nets, rocket nets, drive traps, net guns, dip nets, by hand, etc.) or chemical (alpha-choloralose) methods. Upon capture, birds are transferred to waterfowl crates for relocation to suitable habitat away from the capture site. To discourage the return of waterfowl to capture sites the primary wing feathers of relocated waterfowl are typically clipped. Waterfowl with clipped wings are able to fly after their next molting. As appropriate, WS would consult with the USFWS and/or GADNR to coordinate capture, transportation, and selection of suitable relocation sites.

Smith (1996) reported that groups of juvenile geese relocated from urban to rural settings can effectively eliminate these geese from urban areas, retain them at the release site, include them in the sport harvest, and expose them to higher natural mortality. Smith (1996) also reported that multiple survival models indicated that survival estimates of relocated juveniles were half of those of urban captured and released birds.

Ultimately, the relocation of resident waterfowl from metropolitan communities can assist in the reduction of overabundant populations (Cooper and Keefe 1997), and has been accepted by the general public as a method of reducing waterfowl populations to socially acceptable levels (Fairaizl 1992). In addition, the removal of waterfowl posing or likely to pose a hazard to air safety at airports has been demonstrated to reduce the population of local waterfowl and decrease the number of waterfowl flights through the airport operations airspace; and resulted in increased air safety at the Minneapolis-St. Paul International Airport (Cooper 1991).

Relocation of resident waterfowl has the potential to spread disease into populations of other and/or migrating waterfowl. The AAWV (undated) "...discourages the practice of relocating nuisance or excess urban ducks, geese and swans to other parks or wildlife areas as a means of local population control."

Contraception: Contraceptives have not proven to be an effective method for reducing damage, and currently there are no contraceptive drugs registered with the FDA for waterfowl. Although, Canada geese have been successfully vasectomized to reduce to prevent production of young, this method is only effective if the female does not form a bond with a different male. In addition, vasectomies can only prevent the production of the mated pair. The ability to identify breeding pairs for isolation and to capture a male bird for vasectomization becomes increasingly difficult as the number of birds increase (Converse and Kennelly 1994). Waterfowl have a long life span once they survive their first year (Cramp and Simmons 1977, Allan et al. 1995); leg-band recovery data indicate that some waterfowl live longer than 20 years. The sterilization of resident waterfowl would not reduce the damage caused by the overabundance of the waterfowl population since the population would remain relatively stable. Keefe (1996) estimated sterilization of a Canada goose to cost over $100 per bird.

Egg Destruction/Reproduction Control: Egg addling, oiling, freezing, egg replacement, or puncturing can be effective in reducing recruitment into the local population (Christens et al. 1995, Cummings et al. 1997). Throughout the waterfowl nesting season, waterfowl eggs may be treated or destroyed to eliminate reproduction on the site, which may slow the growth of the local population and increase the effects of waterfowl harassment activities. Geese typically lay one egg every 1-2 days for a total of 4-8 eggs/nest; the incubation period for goose eggs is approximately 28 days. Mallards typically lay between 8 and 10 eggs and the incubation period is between 26-30 days. Mute swans lay between 4-8 eggs and the incubation period is 35-38 days.

While egg removal/destruction can reduce production of young, merely destroying an egg does not reduce a population as quickly as removing immature or breeding adults (Cooper and Keefe 1997). As with other species of long-lived waterfowl, which require high adult mortality to reduce populations (Rockwell et. al 1997), it is likely that adult resident waterfowl must be removed to reduce the population to a level deemed acceptable to communities. Approximately five eggs must be removed to have the effect of stopping one adult from joining the breeding population (Rockwell et al. 1997, Schmutz et al. 1997). Keefe (1996) estimated egg destruction to cost $40 for the equivalent of removing one adult goose from the population. To equal the effect of removing an adult bird from a population, all eggs produced by that bird during its entire lifetime must be removed (Smith et al. 1999). Furthermore, egg removal efforts must be nearly complete in order to prevent recruitment from a small number of surviving nests that would offset control efforts (Smith et al. 1999). Cooper and Keefe (1997), Rockwell et al. (1997), and Schmutz et al. (1997) reported that waterfowl egg destruction is only fractionally effective in attaining population reduction objectives, and that nest/egg destruction is not an efficient or cost-effective damage management or population reduction approach. The Atlantic Flyway Resident Canada Goose Management Plan (Atlantic Flyway Council 1999), states that to effectively reduce resident goose populations, an increase in adult and immature mortality rates, combined with reproductive control, is necessary. Reproductive control alone can not reduce the population in an acceptable time; treatment of 95% of all eggs each year would result in only a 25% reduction over 10 years (Allan et al. 1995). In contrast, reducing annual survival of resident Canada geese by just 10% would reduce a predicted growth rate of more than 15%/year to a stable population, assuming moderate recruitment (Atlantic Flyway Council 1999). In addition, nest destruction is estimated to cost significantly more than other forms of population management (Cooper and Keefe 1997). Egg destruction, while a valuable tool, has fallen short as a single method for reducing local waterfowl populations. Many nests cannot be found by resource managers in typical urban-suburban settings due to the difficulties in gaining access to search the hundreds of private properties where nests may occur. In addition, waterfowl which have eggs oiled in successive years may learn to nest away from the water making it more difficult to find nests.

VerCauteren et al. (2000) and VerCauteren and Marks (2004) examined the use of Nicarbazin (NCZ) to reduce Canada goose egg production and viability, and found that NCZ did experimentally reduce egg viability, but that there were difficulties in delivery methods and acceptance of treated feed. Additional research and field trials to

document the extent to which NCZ is effective and practical as an operational population management tool are needed before this material is available to wildlife managers in field applications.

Capture with Alpha-Chloralose: Alpha-Chloralose (AC) is a central nervous system depressant used as an immobilizing agent to capture and remove pigeons, waterfowl and other birds. It is labor intensive and in some cases, may not be cost effective (Wright 1973, Feare et al. 1981). Alpha-chloralose is typically delivered as a well contained bait in small quantities with minimal hazards to pets and humans; single bread or corn baits are fed directly to the target birds. WS personnel are present at the site of application during baiting to retrieve the immobilized birds. Unconsumed baits are removed from the site following each treatment. Alpha-chloralose was eliminated from more detailed analysis in USDA (1997) based on critical element screening; therefore, environmental fate properties of this compound were not rigorously assessed. However, the solubility and mobility are believed to be moderate and environmental persistence is believed to be low. Bioaccumulation in plants and animal tissue is believed to be low. The compound is slowly metabolized, with recovery occurring a few hours after administration (Schafer 1991). The dose used for immobilization is designed to be about two to 30 times lower than the LD_{50}. Mammalian data indicate higher LD_{50} values than birds. Toxicity to aquatic organisms is unknown (Woronecki et al. 1990), but the compound is generally not soluble in water and, therefore, should remain unavailable to aquatic organisms. Factors supporting the determination of this low potential included the lack of exposure to pets, non-target species and the public, and the low toxicity of the active ingredient. Other supporting rationale for this determination included relatively low total annual use and a limited number of potential exposure pathways. The agent is currently approved for use by WS as an Investigative New Animal Drug by the FDA, rather than as a pesticide.

Alpha-Chloralose may be used only by WS personnel to live capture waterfowl. Pursuant to FDA restrictions, waterfowl captured with AC for subsequent euthanasia must be killed and buried or incinerated, or be held alive for at least 30 days, at which time the birds may be killed and processed for human consumption.

Toxicants: All pesticides are regulated by the EPA. There are currently no toxicants registered with the EPA for use on waterfowl and therefore none would be used by WS.

Hunting: WS sometimes recommends that resource owners consider legal hunting as an option for reducing waterfowl damage. Although legal hunting is impractical and/or prohibited in many urban-suburban areas, it can be used to reduce some populations of resident waterfowl. Legal hunting also reinforces harassment programs (Kadlec 1968). Zielske et al. (1993) believed legal hunting would not reduce resident Canada geese populations where there is limited interest in legally hunting resident geese. However, hunting has had a major impact on the distribution of geese in the Minneapolis-St. Paul Metro Area of Minnesota (Cooper and Keefe 1997). They reported goose densities during the summer in hunted areas of the Metro Area (which comprised only 23% of the area) were significantly lower (three times lower) than densities in unhunted areas. Similarly, Conover and Kania (1991) reported that Canada geese were more likely to cause damage in areas that waterfowl hunting was prohibited. Even in urban/suburban areas (e.g., golf courses and green spaces) there may be locations where controlled hunting would be effective in reducing waterfowl damage. In Georgia, Canada geese are legally harvested during 2 seasons: regular season and early September season. Mallard ducks and snow geese are legally harvested according to the duck/goose season. These seasons and annual harvests are described in Table 3.

Shooting: Shooting waterfowl can be highly effective in removing birds from specific areas and in supplementing harassment. Shooting is the practice of selectively removing target birds. Shooting a few individuals from a larger flock can reinforce birds' fear of harassment techniques. Shooting is used to reduce waterfowl problems when lethal methods are determined to be appropriate. The birds are killed as quickly and humanely as possible. In Georgia, shooting waterfowl pursuant to a depredation permit is conducted primarily by farmers, airport personnel, municipal and county park personnel, and others.

Capture and Euthanize: The most efficient way to reduce the size of resident waterfowl population is to increase mortality among adult waterfowl. Nationwide, hunting is the major cause of waterfowl mortality, but waterfowl may seldom be available to hunters in an urban-suburban environment (Conover and Chasko 1985, Smith et al. 1999). For purposes of lethal control, waterfowl are usually captured with panel nets, rocket nets, drive traps, net guns, dip nets, and/or by hand. Panel nets as described by Costanzo et al. (1995) are lightweight, portable panels (approximate size 4' x 10') that are used to herd and surround waterfowl into a moveable catch pen. This method is equally efficient on hard (pavement) and soft (field) surfaces, and can be employed in such a way as to reduce stress on captured birds (place the catch pen in a shaded area) and control other impacts (place far from roadways). Rocket netting involves the setting of bait in an area that would be completely contained within the dimensions of a manually propelled net. The launching of the rocket net occurs too quickly for the birds to escape. Rocket netting may take place anytime during the year. Using a net gun to capture waterfowl can be conducted anytime during the year by firing a net from a shoulder mounted gun. Waterfowl that are captured and euthanized would be buried, incinerated, or processed for charitable donation.

APPENDIX C

State and Federally listed endangered and threatened species in Georgia

State Listed Threatened and Endangered Species of Georgia
(T-Threatened, E-Endangered)
Georgia Department of Natural Resources
Wildlife Resources Division
Georgia Natural Heritage Program
State listing of protected species for the state of Georgia 4/1/2004

Amphibians

Scientific Name	Common Name	Status
Ambystoma cingulatum	Flatwoods Salamander	T
Haideotriton wallacei	Georgia Blind Salamander	T

Birds

Scientific Name	Common Name	Status
Campephilus principalis	Ivory-billed Woodpecker	E
Charadrius melodus	Piping Plover	T
Dendroica kirtlandii	Kirtland's Warbler	E
Falco peregrinus	Peregrine Falcon	E
Haliaeetus leucocephalus	Bald Eagle	E
Mycteria Americana	Wood Stork	E
Picoides borealis	Red-cockaded Woodpecker	E
Sterna nilotica	Gull-billed Tern	T
Vermivora bachmanii	Bachman's Warbler	E

Fishes

Scientific Name	Common Name	Status
Acipenser brevirostrum	Shortnose Sturgeon	E
Cyprinella caerulea	Blue Shiner	E
Cyprinella callitaenia	Bluestripe Shiner	T
Cyprinella xaenura	Altamaha Shiner	E
Erimystax insignis	Blotched Chub	T
Etheostoma brevirostrum	Holiday Darter	T
Etheostoma chlorobranchium	Greenfin Darter	T
Etheostoma chuckwachatte	Lipstick Darter	E
Etheostoma ditrema	Coldwater Darter	T
Etheostoma etowahae	Etowah Darter	T
Etheostoma scotti	Cherokee Darter	T
Etheostoma trisella	Trispot Darter	T

Etheostoma vulneratum	Wounded Darter	E
Fundulus bifax	Stippled Studfish	E
Fundulus catenatus	Northern Studfish	T
Hemitremia flammea	Flame Chub	E
Lythrurus bellus	Pretty Shiner	T
Moxostoma robustum	Robust Redhorse	E
Notropis ariommus	Popeye Shiner	T
Notropis hypsilepis	Highscale Shiner	T
Notropis photogenis	Silver Shiner	E
Noturus eleutherus	Mountain Madtom	T
Noturus munitus	Frecklebelly Madtom	E
Noturus nocturnes	Freckled Madtom	E
Percina antesella	Amber Darter	E
Percina aurantiaca	Tangerine Darter	T
Percina aurolineata	Goldline Darter	T
Percina jenkinsi	Conasauga Logperch	E
Percina lenticula	Freckled Darter	E
Percina shumardi	River Darter	E
Percina squamata	Olive Darter	T
Percina tanasi	Snail Darter	T
Phenacobius crassilabrum	Fatlips Minnow	E
Phenacobius uranops	Stargazing Minnow	T

Invertebrates

Scientific Name	Common Name	Status
Amblema neislerii	Fat Threeridge	E
Elliptoideus sloatianus	Purple Bankclimber	T
Epioblasma metastriata	Upland Combshell	E
Epioblasma othcaloogensis	Southern Acornshell	E
Epioblasma penita	Southern Combshell	E
Fusconaia masoni	Atlantic Pigtoe Mussel	E
Lampsilis altilis	Fine-lined Pocketbook	T
Lampsilis perovalis	Orange-nacre Mucket	T
Lampsilis subangulata	Shinyrayed Pocketbook	E
Medionidus acutissimus	Alabama Moccasinshell	T
Medionidus parvulus	Coosa Moccasinshell	E

Medionidus penicillatus	Gulf Moccasinshell	E
Medionidus simpsonianus	Ochlockonee Moccasinshell	E
Pleurobema decisum	Southern Clubshell	E
Pleurobema georgianum	Southern Pigtoe	E
Pleurobema perovatum	Ovate Clubshell	E
Pleurobema pyriforme	Oval Pigtoe	E
Ptychobranchus greenii	Triangular Kidneyshell	E

Mammals

Scientific Name	Common Name	Status
Eubalaena glacialis	Northern Right Whale	E
Felis concolor coryi	Florida Panther	E
Felis concolor couguar	Eastern Cougar	E
Megaptera novaeangliae	Humpback Whale	E
Myotis grisescens	Gray Myotis	E
Myotis sodalist	Indiana Myotis	E
Neofiber alleni	Round-tailed Muskrat	T
Trichechus manatus	Manatee	E

Plants

Scientific Name	Common Name	Status
Allium speculae	Flatrock Onion	T
Amphianthus pusillus	Pool Sprite	T
Arabis Georgiana	Georgia Rockcress	T
Arnoglossum diversifolium	Variable-leaf Indian-plantain	T
Asplenium heteroresiliens	Wagner's Spleenwort	T
Baptisia arachnifera	Hairy Rattleweed	E
Calamintha ashei	Ohoopee Dunes Wild Basil	T
Carex baltzellii	Baltzell's Sedge	E
Carex biltmoreana	Biltmore Sedge	T
Carex manhartii	Manhart's Sedge	T
Carex misera	Wretched Sedge	T
Carex purpurifera	Purple Sedge	T
Ceratiola ericoides	Rosemary	T
Clematis socialis	Alabama Leather Flower	E
Croomia pauciflora	Croomia	T
Cuscuta harperi	Harper's Dodder	T
Cymophyllus fraserianus	Fraser's Sedge	T

Draba aprica	Open-ground Whitlow-grass	E
Echinacea laevigata	Smooth Purple Coneflower	E
Elliottia racemosa	Georgia Plume	T
Evolvulus sericeus var. sericeus	Creeping Morning-glory	E
Fimbristylis perpusilla	Harper's Fimbry	E
Fothergilla gardenia	Dwarf Witch-alder	T
Gentianopsis crinita	Fringed Gentian	T
Gymnoderma lineare	Rock Gnome Lichen	E
Hartwrightia floridana	Hartwrightia	T
Helonias bullata	Swamp-pink	T
Hydrastis Canadensis	Goldenseal	E
Hymenocallis coronaria	Shoals Spiderlily	E
Illicium floridanum	Florida Anise-tree	E
Isoetes melanospora	Black-spored Quillwort	E
Isoetes tegetiformans	Mat-forming Quillwort	E
Isotria medeoloides	Small Whorled Pogonia	T
Jeffersonia diphylla	Twinleaf	E
Leavenworthia exigua var. exigua	Gladecress	T
Lindera melissifolia	Pondberry	E
Lindernia saxicola	Rock False Pimpernel	E
Litsea aestivalis	Pondspice	T
Lythrum curtissii	Curtiss' Loosestrife	T
Marshallia mohrii	Coosa Barbara Buttons	T
Matelea alabamensis	Alabama Milkvine	T
Myriophyllum laxum	Lax Water-milfoil	T
Nestronia umbellula	Indian Olive	T
Neviusia alabamensis	Alabama Snow-wreath	T
Oxypolis canbyi	Canby's Dropwort	E
Panicum hirstii	Hirst's Panic Grass	E
Physostegia leptophylla	Tidal Marsh Obedient Plant	T
Pinguicula primuliflora	Clearwater Butterwort	T
Pityopsis pinifolia	Sandhill Golden-aster	T
Platanthera integrilabia	Monkeyface Orchid	T
Ptilimnium nodosum	Harperella	E
Quercus oglethorpensis	Oglethorpe Oak	T

Rhododendron prunifolium	Plumleaf Azalea	T
Rhus michauxii	Dwarf Sumac	E
Sageretia minutiflora	Tiny-leaf Buckthorn	T
Sagittaria secundifolia	Little River Water-plantain	T
Salix floridana	Florida Willow	E
Sanguisorba Canadensis	Canada Burnet	T
Sarracenia leucophylla	Whitetop Pitcherplant	E
Sarracenia oreophila	Green Pitcherplant	E
Sarracenia psittacina	Parrot Pitcherplant	T
Sarracenia purpurea	Purple Pitcherplant	E
Sarracenia rubra	Sweet Pitcherplant	E
Schisandra glabra	Bay Starvine	T
Schwalbea Americana	Chaffseed	E
Scutellaria Montana	Large-flowered Skullcap	T
Scutellaria ocmulgee	Ocmulgee Skullcap	T
Sedum nevii	Nevius' Stonecrop	T
Sedum pusillum	Granite Stonecrop	T
Senecio millefolium	Blue Ridge Golden Ragwort	T
Shortia galacifolia	Oconee Bells	E
Sibbaldiopsis tridentate	Three-tooth Cinquefoil	E
Sideroxylon thornei	Swamp Buckthorn	E
Silene polypetala	Fringed Campion	E
Spiraea virginiana	Virginia Spirea	T
Spiranthes magnicamporum	Great Plains Ladies-tresses	E
Stylisma pickeringii var. pickeringii	Pickering's Morning-glory	T
Thalictrum cooleyi	Cooley's Meadowrue	E
Thalictrum debile	Trailing Meadowrue	T
Tillandsia recurvata	Ball-moss	T
Torreya taxifolia	Florida Torreya	E
Trientalis borealis	Northern Starflower	E
Trillium persistens	Persistent Trillium	E
Trillium reliquum	Relict Trillium	E
Viburnum bracteatum	Limerock Arrow-wood	E
Waldsteinia lobata	Piedmont Barren Strawberry	T
Xyris tennesseensis	Tennessee Yellow-eyed Grass	E

Reptiles

Scientific Name	Common Name	Status
Caretta caretta	Loggerhead	T
Chelonia mydas	Green Sea Turtle	T
Dermochelys coriacea	Leatherback Sea Turtle	E
Drymarchon couperi	Eastern Indigo Snake	T
Eretmochelys imbricate	Hawksbill Sea Turtle	E
Glyptemys muhlenbergii	Bog Turtle	T
Gopherus polyphemus	Gopher Tortoise	T
Graptemys barbouri	Barbour's Map Turtle	T
Lepidochelys kempii	Kemp's Or Atlantic Ridley	E
Macrochelys temminckii	Alligator Snapping Turtle	T

Federally Listed Threatened and Endangered Species of Georgia
(T-Threatened, E-Endangered)
U.S. Fish and Wildlife Service
Nongame Animals and Plants
Threatened and Endangered Species System
Federal listing of protected species for the state of Georgia 5/28/04

Amphibians

Scientific Name	Common Name	Status
Ambystoma cingulatum	Flatwoods Salamander	T

Birds

Scientific Name	Common Name	Status
Haliaeetus leucocephalus	Bald Eagle	T
Charadrius melodus	Piping Plover	T
Mycteria americana	Wood Stork	E
Sterna dougallii dougallii	Roseate Tern	T
Picoides borealis	Red-cockaded Woodpecker	E

Fishes

Scientific Name	Common Name	Status
Acipenser brevirostrum	Shortnose Sturgeon	E
Cyprinella caerulea	Blue Shiner	T
Etheostoma etowahae	Etowah Darter	E
Etheostoma scotti	Cherokee Darter	T
Percina antesella	Amber Darter	E
Percina aurolineata	Goldline Darter	T
Percina jenkinsi	Conasauga Logperch	E
Percina tanasi	Snail Darter	T

Invertebrates

Scientific Name	Common Name	Status
Elliptoideus sloatianus	Purple Bankclimber	T
Epioblasma metastriata	Upland Combshell	E
Epioblasma othcaloogensis	Southern Acornshell	E
Lampsilis altilis	Fine-lined Pocketbook	T
Lampsilis subangulata	Shinyrayed Pocketbook	E
Medionidus acutissimus	Alabama Moccasinshell	T
Medionidus parvulus	Coosa Moccasinshell	E
Medionidus penicillatus	Gulf Moccasinshell	E
Medionidus simpsonianus	Ochlockonee Moccasinshell	E
Pleurobema decisum	Southern Clubshell	E
Pleurobema georgianum	Southern Pigtoe	E

Pleurobema pyriforme	Oval Pigtoe	E
Ptychobranchus greenii	Triangular Kidneyshell	E

Mammals

Scientific Name	Common Name	Status
Eubalaena glacialis	Northern Right Whale	E
Balaenoptera physalus	Finback Whale	E
Megaptera novaeangliae	Humpback Whale	E
Neofiber alleni	Round-tailed Muskrat	T
Trichechus manatus	Manatee	E
Myotis grisescens	Gray Myotis	E
Myotis sodalis	Indiana Myotis	E

Plants

Scientific Name	Common Name	Status
Amphianthus pusillus	Little Amphianthus	T
Baptisia arachnifera	Hairy Rattleweed	E
Clematis socialis	Alabama Leather Flower	E
Echinacea laevigata	Smooth Purple Coneflower	E
Helonias bullata	Swamp-pink	T
Isoetes melanospora	Black-spored Quillwort	E
Isoetes tegetiformans	Mat-forming Quillwort	E
Isotria medeoloides	Small Whorled Pogonia	T
Lindera melissifolia	Pondberry	E
Marshallia mohrii	Coosa Barbara Buttons	T
Oxypolis canbyi	Canby's Dropwort	E
Ptilimnium nodosum	Harperella	E
Rhus michauxii	Sumac, Michaux's	E
Sagittaria secundifolia	Little River Water-plantain	T
Sarracenia oreophila	Green Pitcherplant	E
Schwalbea americana	Chaffseed	E
Scutellaria montana	Large-flowered Skullcap	T
Silene polypetala	Fringed Campion	E
Spiraea virginiana	Virginia Spirea	T
Torreya taxifolia	Florida Torreya	E
Trillium persistens	Persistent Trillium	E
Trillium reliquum	Relict Trillium	E
Xyris tennesseensis	Tennessee Yellow-eyed Grass	E

Reptiles

Scientific Name	Common Name	Status
Caretta caretta	Loggerhead	T
Chelonia mydas	Green Sea Turtle	T
Dermochelys coriacea	Leatherback Sea Turtle	E
Eretmochelys imbricata	Hawksbill Sea Turtle	E
Lepidochelys kempii	Kemp's Or Atlantic Ridley	E

Appendix D

USFWS Letter of Concurrence

United States Department of the Interior

Fish and Wildlife Service
105 WestPark Drive, Suite D
Athens, Georgia 30606

West Georgia Sub Office
P.O. Box 52560
Ft. Benning, Georgia 31995-2560

Coastal Sub Office
4270 Norwich Street
Brunswick, Georgia 31520

JAN 0 7 2005

Mr. Doug Hall
USDA Wildlife Services
School of Forest Resources
The University of Georgia
Athens, Georgia 30602

Re: NG-05-161-GEN

Dear Mr. Hall:

The U.S. Fish and Wildlife Service (Service) has recently reviewed the Wildlife Services, Environmental Assessment and Biological Evaluation for Reducing Waterfowl Damage in Georgia, provided to us, submitted in November 2004. We submit these comments under provisions of the Endangered Species Act of 1973 (ESA) as amended (16 U.S.C. 1531 et seq.).

Based on the information provided, we concur with your finding of not likely to adversely affect federally listed species. However, consultation under section 7 (a)(2) of the ESA must be re-initiated if any of the following incidents occur: (1) new information reveals impacts of this identified action that may affect listed species in a manner not previously considered; (2) this action is subsequently modified in a manner that was not considered in this assessment; or (3) a new species is listed or critical habitat determined that may be affected by the identified action.

If you have any questions please contact staff biologist Jimmy Rickard at (706) 613-9493 ext. 23.

Sincerely,

Sandra S. Tucker

Sandra S. Tucker
Field Supervisor